

For Reference

NOT TO BE TAKEN FROM THIS ROOM

For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex libris
UNIVERSITATIS
ALBERTAE



THE UNIVERSITY OF ALBERTA

AN ANALYSIS OF SCHOOL INFLUENCE
AND SUBGROUP STRUCTURES

by

ELMER ALFRED BREITKREUZ



A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL ADMINISTRATION

EDMONTON, ALBERTA

OCTOBER, 1967

UNIVERSITY OF ALBERTA
FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read,
and recommend to the Faculty of Graduate Studies
for acceptance, a thesis entitled "An Analysis of
School Influence and Subgroup Structures" submitted
by Elmer Alfred Breitzkreuz in partial fulfilment of
the requirements for the Degree of Master of
Education.

ABSTRACT

The purposes of this study were to examine differences between influential and non-influential school staff members on a number of variables for six different influence dimensions and to determine differences in their reaction to the school. Five of the dimensions were included in the formal or task area structure of the school. These were one communication, three reliance and one attributed influence dimension; the socialization dimension was considered to be part of the informal structure. Subgroup membership in communication and socialization was also determined to see if differences existed between the two dimensions and if individuals within a particular subgroup had similar characteristics.

Data were gathered by means of a questionnaire which was administered to all of the staff members in eighteen schools, or a total of 389 people. The data were punched on IBM cards and analyzed with the aid of a computer. A matrix multiplication method and weighting system developed by Blocker et al. was used to determine the influential people on each dimension for each school. Subgroup membership was determined by the use of factor analysis.

Influentials on the dimensions in the formal structure in nearly all cases had more total teaching experience,

had taught longer in the present school, had more years of teacher preparation, taught at higher grade levels in their schools than non-influentials, and were of the male sex. Influentials on several dimensions tended to be older than non-influentials. All principals and three-fourths of the vice-principals were influential on the three reliance dimensions as well as on the attributed influence dimension. People who were influential on one of the task area dimensions tended to be influential on the other four dimensions as well. The fact that an individual was considered influential by his fellow staff members was not related to satisfaction with his job, nor did he consider his school more effective in teaching its students than did non-influentials.

School subgroups in communication and socialization showed many of the same staff members to be in corresponding groups of the two dimensions, contrary to a hypothesized relationship. Five different types of school group structure were developed and three different subgroup types were characterized on the basis of personal variables.

The methods employed to determine both influentials and subgroups in school staffs were found to be quite useful, and led to the identification of a number of significant differences between influentials and non-influentials in school staffs. The types of subgroup structure found left a number of unanswered problems worthy of further investigation.

ACKNOWLEDGEMENTS

The writer of this thesis acknowledges the valuable counsel and guidance given throughout the course of the study by Dr. Erwin Miklos, the supervisor of the thesis. His assistance was invaluable in the completion of this work. The work of Dr. D. A. MacKay and Dr. M. A. Nay as members of the thesis committee is also appreciated.

The writer further appreciates the work of L. M. Bezeau of the University of Alberta for his assistance in programming the data for computer analysis.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
The Problem.	1
Significance of the Problem.	4
Limitations.	6
Delimitations.	7
Overview of the Thesis	7
Bibliography for Chapter I	9
II. REVIEW OF THE RELATED LITERATURE, DEFINITIONS, AND HYPOTHESES	10
Formal Organization.	10
Informal Organization.	12
Relationship of the Informal to the Formal Organization	14
Communication.	16
Decision-making.	16
Introduction of innovations.	17
Agent of social control.	17
Groups	18
Proximity.	20
Similar individual characteristics	20
Common interests or values	20
Personality.	21
Studies Related to the School.	21

CHAPTER	PAGE
Definitions - General.	26
Definitions - Operational.	27
Hypotheses	28
Bibliography for Chapter II.	34
III. INSTRUMENTATION AND DATA COLLECTION.	37
The Instrument	37
Description of the Sample.	38
Reliability and Validity	41
Bibliography for Chapter III	44
IV. APPLICATION OF MATRIX OPERATIONS TO THE DATA . .	45
Development of Sociomatrix Techniques.	45
The Communication Sociomatrix.	48
The Determination of Influentials on	
Communication.	56
The Reliance Weighting Method.	57
The Attributed Influence Dimension	65
The Application of Factor Analysis to	
Subgroup Detection	65
Factor Analysis Results for School 3 on	
Communication.	69
Summary of Chapter IV.	78
Bibliography for Chapter IV.	79
V. RESULTS OF THE STUDY CONCERNING INFLUENTIALS . .	81
Test of Hypothesis One	81

CHAPTER	PAGE
Summary of Results of Tests of Hypothesis One	90
Test of Hypothesis One on an Individual	
School Basis	94
Test of Hypothesis Two	95
Test of Hypothesis Two on an Individual	
School Basis	100
Test of Hypothesis Three	101
Test of Hypothesis Four	105
Test of Hypothesis Five	107
Tests of Other Relationships	110
Summary of Chapter Five	113
Bibliography for Chapter V	115
VI. RESULTS OF THE STUDY CONCERNING SUBGROUPS . . .	116
Some Findings in the Study of Group Structure.	116
Description of Types of Group Structures . . .	123
Test of Hypothesis Six	130
Test of Hypothesis Seven	136
Description of Selected Subgroups	146
Conclusions Arising out of Tests of	
Hypothesis Seven	150
Bibliography for Chapter VI	154
VII. CONCLUSIONS AND IMPLICATIONS	155
Summary of Findings and Conclusions	155

	PAGE
Implications for Educational Administration . . .	160
Suggestions for Further Study	162
Bibliography for Chapter VII	165
BIBLIOGRAPHY	167
APPENDIX A	172
APPENDIX B	179

LIST OF TABLES

TABLE	PAGE
I. Classification of Schools in the Sample by Grade Levels.	39
II. Classification of Schools in the Sample by Size of Staff	40
III. Number of Influentials for each School on each Dimension	58
IV. Summary of Percentage of Total Variance Accounted for by the Factors Used in Schools.	70
V. Unrotated Factor Pattern Matrix for School 3 on Communication.	75
Va. Factor Pattern Matrix, Varimax Rotation, for School 3 on Communication.	76
VI. Results of t-Tests Between Means of Influ- entials and Non-influentials on Communica- tion	84
VII. Results of t-Tests Between Means of Influ- entials and Non-influentials on Reliance as to Discipline (Rel. 1).	85
VIII. Results of t-Tests Between Means of Influ- entials and Non-influentials on Reliance as to Teaching Methods and Materials (Rel. 2)	87

TABLE

PAGE

IX.	Results of t-Tests Between Means of Influentials and Non-influentials on Reliance as to School Policies and Regulations (Rel. 3)	88
X.	Results of t-Tests Between Means of Influentials and Non-influentials on the Attributed Influence Dimension	89
XI.	Summary of t-Test Results Showing Significance Levels on Five Task Area Dimensions. .	91
XII.	Summary of Chi Square Results for Male-Female Differences on Five Task Area Dimensions . .	92
XIII.	Pearson Product Moment Correlations for a Number of Variables.	94
XIV.	Summary of t-Test Comparisons of Means Between Influentials and Non-influentials Within Each School on Five Task Area Dimensions	96
XV.	Results of t-Tests Between Means of Influentials and Non-influentials on Reliance as to Discipline (Rel. 1) for School 8 . . .	97
XVI.	Frequency Table for Chi Square Test for Satisfaction with Teaching on Communication Dimension.	98

TABLE	PAGE
XVII. Summary of Chi Square Tests for Tests of Hypothesis Two	99
XVIII. Ranking of School Administrators as Influ- entials	102
XIX. Frequency Table of Number of Task Area Dimensions in which Adminstrators are Influential	106
XX. Frequency of Individuals Who were Influent- ial on Three or More Task Area Dimensions in Each School	109
XXI. Results of t-Tests Between Means of Generalized Influentials and all Other Individuals	111
XXII. Results of t-Tests Between Means of Administrators and Non-administrators	112
XXIII. School Subgroups Classified by Types	118
XXIV. Frequency Distribution of Subgroups by Size	121
XXV. Summary of Spearman Rho Tests Between Staff Size and a Number of Group Variables	122
XXVI. Commonality of Members in Communication and Socialization Networks of Schools	131
XXVII. Distribution of Subgroups in which the Percent- age of Members of One Subgroup is Common to its Corresponding Subgroup in the Other Dimension	134

TABLE	PAGE
XXVIII. Frequency of Members and Mean Age of School 1 Socialization Subgroups	137
XXIX. Summary of Analysis of Variance for Age Vari- able of School 1 Socialization Subgroups.	137
XXX. Summary of Analysis of Variance for School 1 Socialization Subgroups	138
XXXI. Means of Socialization Subgroups in School 1.	140
XXXII. Frequency of Schools in which a Given Number of Variables is Significant at the 0.10 Level in Analysis of Variance Tests	142
XXXIII. Frequency of Schools in which a Given Variable is Significant in Analysis of Variance Tests	144
XXXIV. Subgroups Classified by Sex of Their Members.	145
XXXV. School 3 Socialization Subgroup Means	147
XXXVI. School 6 Communication Subgroup Means	149
XXXVII. Distribution by Age of School Staff Members in the Sample	179
XXXVIII. Distribution by Total Years of Teaching Experience of Teachers in the Sample	180
XXXIX. Distribution by Years of Teaching Experience in Their Present School of Teachers in the Sample	181

TABLE

PAGE

XL.	Distribution by Years of Teacher Education for Salary Purposes of Teachers in the Sample . .	182
XLI.	Grade Levels at which Teachers in the Sample Spend Most of Their Teaching Time	183
XLII.	Percentage of Total Variance Accounted for by the Factors for Each School Analysis . . .	184

LIST OF FIGURES

FIGURE	PAGE
1. Unreciprocated Communication Sociomatrix for School 3	49
2. Reciprocated Communication Sociomatrix for School 3	51
3. Second Power Communication Matrix for School 3 . . .	53
4. Third Power Communication Matrix for School 3. . .	55
5. First Power Matrix for School 5 on Reliance 3. . .	60
6. Cubed Matrix for School 5 on Reliance 3.	62
7. Cubed Matrix with Substituted Subweights for School 5 on Reliance 3	64
8. School 3 Communication Sociogram	71
9. School 3 Socialization Sociogram	71
10. School 3 Reciprocated Communication Matrix with Ones in Main Diagonal.	73
11. School 3 Cubed Communication Matrix Adjusted for Factor Analysis.	74
12. Sociogram for School 18, Communication	120
13. Sociogram for School 4, Communication.	124
14. Sociogram for School 1, Socialization.	126
15. Sociogram for School 9, Socialization.	128

CHAPTER I

INTRODUCTION

In order to carry out more effectively the tasks expected of them, school administrators should have a comprehensive grasp of interpersonal influence and an understanding of the implications of such influence for the effective functioning of an organization. These tasks will normally include among others decision-making, planning, organizing, directing, communicating, and coordinating (4, pp. 138-151).

As do other organizations, schools have both formal and informal aspects to their social structure. In any organization there are individuals who wield more influence than others. The individuals who constitute the influence structure in schools, both in the formal and informal organization, are an area of concern in administrative study and research, particularly in view of the fact that few studies on influence structures have been conducted across a sample of schools.

The Problem

The major aims of this study were (1) to identify the influentials on each of six dimensions in both the formal and informal school staff structure for a number of

schools, and (2) to determine whether influentials differed significantly from non-influentials on a number of characteristics. The influence dimensions under study were as follows:

1. communication
2. socialization
3. reliance as to discipline
4. reliance as to organization of teaching methods and materials
5. reliance as to school policies and regulations
6. attributed influence

The influentials on each dimension were referred to as specific influentials; generalized influentials were also identified. Another part of the problem was to identify subgroups on the communication and socialization dimensions, and consequently to determine whether there were similar characteristics among the individuals comprising a subgroup. The socialization dimension in the list above was considered to be a part of the informal organization; the other five dimensions were considered to be in the formal structure of the school, or task area dimensions.

Following are some sub-problems to which attention was directed in pursuing the study:

1. Are individuals in administrative positions such as that of principal or vice-principal considered to be

influential in specific task areas?

2. Do influentials on a specific task area dimension also tend to be influential on the other task area dimensions?

3. Do the influentials on each of the five task-oriented dimensions differ significantly in some characteristics from non-influentials on those same dimensions? For example, are influentials older than non-influentials? Do they have more teaching experience? Have they been in their particular school longer? Do they have more years of teacher education? Do they teach at the upper grade levels in their school?

4. What is the reaction to the school of an individual classified as an influential? Is he more satisfied than other teachers with such matters as the present teaching situation, and does he judge his school to be more effective in educating its students?

5. Which staff members make up the subgroups in each of the communication and socialization dimensions? Is there a difference in the members who make up the subgroups in each dimension?

6. Do the individuals who comprise a given subgroup have some similar characteristics? For example, are they of the same sex? Are they similar in age, years of training, grade level taught, and length of experience

in their present school?

Significance of the Problem

Griffiths reports that there is a paucity of studies on school social structure (6, p. 225, 287). He states further that because of a lack of studies, there exist a number of misconceptions, half-truths, and superstitions concerning the school social organization. Educational research has been directed more toward the study of practices and techniques of school personnel rather than inquiring into the system of interrelationships which exist within a school.

In 1957 Congreve (5) carried out a case study of the social structure of two schools matched as to size and population characteristics, but with different types of administrative leadership. One type of leadership was formal and impersonal and the other was informal and personal. Iannaccone (8) found five subgroups within the twenty-six member staff of an elementary school; similarity of characteristics of the members had a bearing on the formation of these subgroups. Blocker (3) studied interpersonal influence in curriculum matters in a number of American Southwestern junior colleges, using a matrix analysis technique to identify the influentials and factor analysis to identify subgroups from a sociometric questionnaire.

He suggested the application of this method of group analysis to public schools as well.

McCleary (9) was one of the first researchers to study the influence structure in the school by means of a matrix analysis technique, studying the communication structure in a single school by this method. House in a very recent study applied Blocker's method to a Canadian high school whose staff consisted of thirty-eight members (7). Bezeau (1), in a recent Alberta study, found differences between the communication and socialization dimensions in eighteen schools studied. With the exception of Bezeau's study, those investigations concerned with public schools were limited to case studies of single schools, and in one case two schools were studied.

In view of the above it must be concluded that little research has been done on influence patterns in school social systems across a number of schools. There is, therefore, a limited body of knowledge with regard to school staff influence structures, and an apparent need for empirical data from which can eventually come more adequate theories of organization; such theories would provide a basis for a more rational approach to the activities of administrators (2, p. 5). It should thus be useful to look at the influence structures in a larger number of schools, and to see if any repetitive patterns emerge.

Furthermore, other than the studies made by Blocker of identifying subgroups in a number of American colleges using factor analysis, little use has been made of this technique for this purpose in schools. Further exploration in the application of this technique would seem to be worthwhile.

Limitations

A limitation of the study is that which accrues to sociometric measures, which were used as a part of the questionnaire. A limitation of any sociometric technique is that it is based upon a respondent's perception of a situation, and it does not describe what actually happens. There is a limitation as to the degree of accuracy of the perceptions of reality which can be obtained from the respondents.

A further limitation is that schools which participated in the study were not a randomly selected sample. The sample consisted of all the staff members in the eighteen schools which agreed to participate.

Finally the operational definitions, which are of necessity arbitrary, used in this study represent another limiting factor. Cases in point are the definitions of "subgroup" and "influential." The arbitrary definition of "influential" could include individuals who were not highly

influential as influentials, and exclude from this category those who exercised considerable influence. The definition used also made the number of influentials quite dependent on school size, which may not always be true for influence structures.

Delimitations

The study included only those schools which responded favorably to the initial request for cooperation in the study. Thus it was confined to eighteen schools in north central Alberta in rural and town locations; no city schools were included in the study.

The study was confined to the determination of influentials on six dimensions of behaviour and to the analysis of the relationship of personal characteristics and satisfaction measures for those individuals classified as influentials. It was delimited further to the determination of subgroups on only the communication and socialization dimensions, and the examination of similarity of member characteristics within these subgroups.

Overview of the Thesis

This chapter has outlined the problem generally as well as the significance of the problem for the study. Chapter II reviews the related literature for the study and includes the definitions and the statement of the hypotheses

to be investigated.

Chapter III describes the instrumentation and data collection procedures, and gives a brief description of the sample. Consideration is also given to the problems of reliability and validity.

Chapter IV describes the matrix operations used, together with their rationale, in some detail. Actual examples of computer-constructed matrices are included from two schools for purposes of illustration and explanation of the method.

Chapter V describes the results of the tests of the first five hypotheses, all of which were concerned with influentials on the five task areas of the study.

Chapter VI reports the results of the tests of the remaining two hypotheses, which concerned the identification of subgroups on two dimensions followed by a comparison of characteristics of individuals within subgroups. The final chapter, Chapter VII, states the conclusions arising out of the study, indicates some implications for educational administration and gives suggestions for further research.

BIBLIOGRAPHY FOR CHAPTER I

1. Bezeau, Lawrence. "The Instrumental-Expressive Dichotomy in School Staffs." Unpublished M. Ed. thesis, University of Alberta, 1966.
2. Blocker, C. E., R. H. McCabe, and A. J. Prendergast. A Method for the Sociometric Analysis of the Informal Organization Within Large Work Groups. Austin, Texas, 1964.
3. Blocker, C. E. and R. H. McCabe. Relationships Between the Informal Organization and the Curriculum in Six Junior Colleges. Austin, Texas, 1964.
4. Campbell, R. F., J. E. Corbally, and J. A. Ramseyer. Introduction to Educational Administration, Third Edition. Boston: Allyn and Bacon, Inc., 1966.
5. Congreve, Willard J. "Administrative Behaviour and Staff Relations," Administrator's Notebook, VI (Oct., 1957).
6. Griffiths, D. E., D. Clark, R. Wynn, and L. Iannaccone. Organizing Schools for Effective Education. Danville Ill.: Interstate Publishers and Printers, Inc., 1961.
7. House, J. H. "An Analysis of Interpersonal Influence Relations." Unpublished Ph. D. thesis, University of Alberta, 1966.
8. Iannaccone, Lawrence. "The Social System of an Elementary School Staff." Unpublished Ed. D. thesis, Teachers' College, Columbia University, 1958, reported in D. E. Griffiths, D. Clark, R. Wynn, and L. Iannaccone. Organizing Schools for Effective Education. Danville, Ill.: Interstate Publishers and Printers, Inc., 1961.
9. McCleary, Lloyd E. "A Study of Interpersonal Influence Within A School Staff." Unpublished Ed. D. thesis, University of Illinois, 1957.

CHAPTER II

REVIEW OF THE RELATED LITERATURE, DEFINITIONS, AND HYPOTHESES

This chapter deals with the concepts of the formal and informal organization and with the relationship of one to the other. It is concerned with the formation and characteristics of groups and subgroups; reviews are presented of those studies which have been carried out in schools with respect to the school as a social system and subgroup formation within the system. Definitions used in the study are included and the hypotheses developed in the last section.

Formal Organization

In formally organized groups, the activities of members are prescribed by official rules and regulations. These prescriptions and requirements are impersonal in that they apply to the occupants of certain positions in the group structure, such as that of manager, salesman, workman, and so on. The role requirements are largely independent of the individual occupying the position at a given time (19, p. 73).

The classical model of organization is that of the bureaucracy as first systematized by Weber. In general the

bureaucratic model involves the following:

1. a hierarchical organizational structure which gives a clear definition of offices, and lines of authority and communication;
2. specialization of various functions;
3. formal rules and regulations, usually written, defining the function of any office, as well as designating the procedures for dealing with situations and individuals both inside and outside the organization (26).

The whole emphasis in the bureaucratic model is on efficiency. The development of the model gave rise to a number of well-known principles of formal organization which have been outlined by various writers including Argyris (2, p. 12).

The formal organization, or rationally planned aspects of the school structure, include the positions of the principal, vice-principal, teachers, and students; the subgroup structures consist of administrative personnel, elementary teachers, junior and senior high school teachers, and students (22, p. 21). Charters (8) mentions a number of functions performed within the formal structure of the school. Some of these are room assignment of teachers, home-room assignment of pupils, departmentalization, allocation of teacher workload, and ability grouping practices. Others include decisions as to time-tabling and the

semester system, attendance regulations, provision for and coordination of recreational programs, scheduling of examinations, and securing and allocation of supplies. Charters further indicates that the coordination of many of the above functions is achieved through communication among teachers, and not just through the activities of administrators.

Informal Organization

Underlying the formal structure of most large scale organization is an intricate network of social groupings which are not formally delineated (19, p. 73). This is the informal organization; it is that complex of interpersonal relations within the organization which meets the individual's needs for satisfactory human relationships, but is usually not taken into consideration by the formal organization (17, pp. 224-225). Study of the informal organization began with such studies as the now well-known Hawthorne studies of the Western Electric Company, carried out by Mayo and Roethlisberger. In these studies it was found that a set of norms operated among the workers apart from the formal prescriptions of the organization (23).

Barnard defines informal organization as the aggregate of the personal contacts and interactions among associated groupings of people (3, p. 115). Common or joint purposes are not included in the definition, but nevertheless

are included in such interaction. Barnard states:

Informal organization is indefinite and rather structureless, and has no definite subdivision. It may be regarded as a shapeless mass of quite varied densities, the variations in density being a result of external factors affecting the closeness of people geographically or of formal purposes which bring them specially into contact for conscious joint accomplishments. These areas of special density I call informal organization in its informal aspects...there are informal organizations related to formal organizations everywhere (3, p. 115).

Griffiths sees the informal organization as being important in decision-making and defines it as "the system of interpersonal relations which forms within an organization to affect decisions of the formal scheme or is in opposition to it" (12, p. 227). Griffiths' view of the informal organization differs somewhat from that of Barnard. Barnard saw the informal organization as an indefinite, structureless grouping, but Griffiths contends that it maintains itself over long periods of time and has a structure containing definite subdivisions. He cites several examples which bear out his view (12, pp. 225-293). Similarly, Miklos indicates with respect to the school that the informal organization among staff in time probably structures itself to an extent much greater than that envisaged by those who established the formal framework (22, p. 22).

Some organizational writers object to including all residual factors which cannot be included in the formal

framework, in the definition of informal organization. Dubin (10) distinguished among four behaviour systems in organizations: technological, formal, non-formal, and informal. In his view, every member of a work organization operates in all four systems in performing his job.

Relationship of the Informal to the Formal Organization

Even though some organizations may minimize or ignore the operation of the informal organization, organizational writers testify as to its importance. Iannaccone states three broad views of the relationship of the informal organization to the formal:

1. it may be subversive of the formal organization;
2. it may give healthy support to the goals of the formal organization;
3. it provides for the psychological welfare of organizational members (17, pp. 223-224).

Barnard indicates that the activities of an individual take place within groups; it is these activities which relate him to the larger group. One of the essential needs of man is association, requiring immediate interaction between individuals (3, pp. 117-118) (20). Such interaction helps him to bear up under routine and in times of danger; this is one need that the informal organization fulfills. He points out that society is structured by formal

organizations, but these are in turn vitalized and conditioned by the informal organization. One cannot exist without the other, for if one fails, the other disintegrates.

Barnard goes on to say that the informal organization performs the following important functions:

1. it facilitates communication;
2. it maintains cohesiveness through regulating the willingness to serve and the stability of objective authority;
3. it maintains a feeling of personal integrity, self-respect, and independent choice (3, p. 122).

Argyris agrees with Barnard on the last-named function, namely that the informal organization serves to maintain the personality of the individual (1). Through informal interaction the individual can find his personality and social needs satisfied, which needs may not be satisfied in the formal structure.

Iannaccone indicates that beneath the formal organization there is a world consisting of how things really get done and how people really behave in organizations (17, p. 223). This is the world of the informal organization which may differ from formal prescriptions. It is conceivable that the informal organization could modify the formal structure. Griffiths states that it

complements, supplements, and modifies the behaviour prescribed by the formal organization. It can increase or decrease efficiency, restrict output, or force the organization to adapt and make changes (25, p. 52).

The informal organization is seen as being very important to the smooth functioning of the formal organization. Writers concern themselves with its importance in communication, decision-making, the introduction of innovations, and as an agent of social control.

Communication. Effective communication in a bureaucratic organization is often difficult, and administrators may need to rely on the informal communication network or "grapevine" to get messages transmitted. Barnard states that "informal organization is essential to formal organization, particularly with reference to communication" (3, p. 224). Miklos refers to its importance in communication as well:

The social structure of the school also serves as a communication network through which information may be transmitted more quickly than it is by formal procedures through official channels (22, p. 27).

Decision-making. Miklos states that it is "within the context of human relationships that administrative decisions are received, discussed, evaluated, and operationalized" (22, p. 27). This may be functional for the organization if groups or subgroups are influenced to act

appropriately. On the other hand the decision might be modified slightly by the group, or it might even be ignored or contrary action taken. Iannaccone in a recent study found that in a school subgroups existed which had common sentiments and attitudes concerning administrative decisions. Where the group could not get a satisfactory response to up-the-line communication in the formal structure, the informal organization was used in an attempt to obtain a satisfactory response (12, p. 240). The importance of recognizing the presence of informal organization when making decisions is apparent.

Introduction of innovations. Having reference to the school, Miklos states that it is within the context of the social structure that innovations are discussed and proposed by teachers, and received and evaluated by the principal (22, p. 27). The informal groups and subgroups of teachers are a much less inhibited group and more likely to discuss the innovation amongst themselves before it is formally proposed by a teacher.

Agent of social control. Informal organizations generate a culture based on certain norms of conduct which in turn demand conformity from group members. These standards may be at odds with the values set by the formal organization, so that the individual might very well find

himself in a situation of conflicting demands.

Groups

Pertinent to the operation of both the formal and the informal organization is the existence of groups, which are the component parts of any organization. The group is a sociological concept defined as "any set of two or more persons who take each other into account in their actions and thus are held together and set apart from others by virtue of their interaction" (19, p. 67). The key word in the group concept is interaction; there must be mutual influence, otherwise there is only a collection of people. Mere physical proximity or possession of certain common characteristics does not make a meaningful group unless there is interaction among the persons involved.

Groups may be further classified into categories such as the following: primary and secondary, voluntary and involuntary, formal and informal, in-group and out-group. One of the broadest and most fundamental distinctions is that between primary groups and secondary groups. The former are usually small, intimate, and of long duration in contrast to the latter which are more formal, large, impersonal, and of shorter duration. In this sense, the school staff as a whole could be classified as a secondary group in larger schools. Subgroups which develop within the staff structure might be of the primary kind.

Within the groups that exist in an organization subsystems and subgroups might emerge. Miklos defines these as consisting of people who interact more frequently with each other than with other people in a particular context (22, p. 22).

In all human social systems people like and dislike, accept and reject each other in varying degrees. These similarities and differences of persons and groups give rise to attractions and repulsions which form social networks or subgroups. When there is deviation in a larger group, there is a tendency for subgroups to form. The tendency for subgroups to form is not only related to size but also to the degree to which the norms of the larger group provide an adequate basis for group maintenance and goal attainment. Where the means to goals are not clear, large groups are more likely to break up into subgroups where each of the subgroups may express a different problem-solving approach (7, pp. 86-88). Blum indicates that subgroup formation often occurs under authoritarian type of leadership (6, pp. 44-47). Hare (14) reports some data supporting the assumption that there is a greater tendency for larger groups to break up into subgroups. He found, for example, that discussion groups of twelve members are more likely to break into small, often conflicting subgroups, than are those with six members.

Hare (13, pp. 139-141) suggested four factors which contribute to the development of close interpersonal relations, such as might be found in subgroups. These are (1) proximity, (2) similar individual characteristics, (3) common interests or values, and (4) similar personality.

Proximity. Proximity is an obvious factor as persons who live or work near each other become friends more often than those stationed far apart. Work organization conditions affect the opportunities for interaction and have a bearing on subgroup development. This is also true with respect to place of residence, as was evident in a study of two differently designed housing projects conducted in 1950 by Festinger, Schachter, and Back (11). Spatial proximity was an important factor in friendship formation.

Similar individual characteristics. Persons who choose each other tend to have similar characteristics such as age, intelligence, and sex. In the school other factors might conceivably be at work in the emergence of subgroups. Possible factors might be amount of training, amount of experience, and tenure in the school (22, p. 23).

Common interests or values. Hare (14) lists the following among other interests and values influencing group

formation: similar ideologies, religion, ethnic group, and social class. In the school staff subgroups might be comprised of teachers of similar grade levels or subject matter fields. They might also develop around common interests in other areas such as athletics or music, or in similar opinions of the aims of education.

Personality. Hare reports a number of studies which show that individuals of similar personality types tend to choose each other (13, pp. 140-141). Miklos is of the opinion that personality factors may be more important in determining the nature of the relationships rather than the relationships themselves (22, p. 23).

Studies Related to the School

Research on the school as a social institution is quite scanty, and any that exists is of recent origin. Jensen (18), in one of the earlier writings on the school as a social system, indicates that social groups are the fundamental units upon which observation and study should be focused. He saw the system of interacting groups as basically structured and as having a two-fold aim: accomplishing the educative tasks demanded by society and the fulfilment of the needs of the group's members.

In 1957 Congreve (9) carried out a case study of the social structure of two schools matched as to size and

population characteristics, but with different types of administrative leadership. It was found that school staff tended to prefer the formal, impersonal approach to administration rather than the informal, personal approach. Those staff members occupying power positions in the school tended to be older, had long experience in the school and were rated most highly by the administrators.

As a result of this study Congreve hypothesized that where administrative behaviour does not satisfy the professional needs of staff, subgroups are more likely to form and divide the school into opposing camps. The implications of his study are that the principal should not become a part of the informal system, but rather be concerned with keeping the organization's goals before each of its subgroups.

Iannaccone (16) conducted a study of a school district and of the social system of an elementary school within that district, consisting of twenty-six staff members. He found the informal staff organizations of this school characterized by two pyramids, each led by a member of the staff. These members were chosen by the staff to represent them to organizations outside the school, but only after these members had developed as leaders of the informal staff organization.

Iannaccone found the staff to be made up of five

distinct primary groups. The groups and pyramids differed from each other in their views but all concurred in one respect. This was that formulation and administration of school policy came from the top down, and that all staff members were working to revise this top down situation. The subgroups showed that similarity of characteristics such as age, grade level taught and teaching area, room assignment, and similarity of attitudes had a bearing on their formation. Subgroups could be found in activities such as eating lunch or seated as a group at staff meetings.

In this school Iannaccone found that the relationships between the formal and informal organization were not unidirectional, but that each one was able to influence the other. He concluded that a school staff is a social system with subgroups whose members interact freely and hold common sentiments or attitudes.

McCleary (21) used a sociometric questionnaire to study the communication structure in a single school. He was one of the first researchers to study the influence structure in the school by means of a technique involving matrix analysis. He used the reciprocated matrix and raised it to the second and third powers in order to find secondary and tertiary communication links in the system. With this method he was able to identify the person-to-person communication networks with a high degree of accuracy.

House (15) recently completed a study of the influence structure in a Western Canadian high school whose staff consisted of thirty-eight members. He made use of a sociometric questionnaire in which staff members were asked to identify those people on staff they communicated with, relied on, and to whom they attributed influence on each of twelve task topics related to the school. This questionnaire was then followed up by a personal interview with each of the respondents. Following are some of his more pertinent findings:

1. The principal was considered influential on every task topic.
2. The vice-principal was considered influential on eight of the twelve task topics.
3. There was a significant relationship between amount of influence and years of training.
4. There was no significant relationship between amount of influence an individual had and his age.
5. There was a significant relationship between amount of influence and experience in the school on but two of twelve task topics.
6. The social structure tended to be incongruent with the influence structure in several ways. For example, the administrators, who were influential in most task topics, had very few social links.

Bezeau (4), in a recent Alberta study, examined differences between the instrumental and expressive structures of school staffs and identified some correlates of this difference. He defined the instrumental structure as the pattern of interaction within the staff directed toward group goal achievement, and the expressive structure as the pattern of interaction directed toward the satisfaction of group needs, such as the need for socialization, emotional expression, and group maintenance. He found that the two structures differed somewhat in the school. Staff members discussed matters related to the school and teaching with people different from those with whom they socialized, and the positions of teachers in the two structures were found to correlate with certain personal characteristics. He was able to draw up several statistical teacher profiles from the study. These were of the male teacher, the older teacher, and the teacher with more training. For example, the male teacher profile shows that he considers the school less effective, is less satisfied with teaching, considers the principal less effective, is younger, and has more training.

Definitions with reference to the present study will now be presented.

Definitions - General

Social system. A social system consists of patterns of interpersonal human behaviour which are interdependent in such a way that a change in one pattern tends to be minimized by consequent changes in the others.

Group. A group is a set of two or more people who take each other into account in their actions. The members are held together and set apart from non-members because of their interaction with each other.

Influential. An influential is an individual who has power arising from his position, station, or special knowledge.

Communication. Communication refers to the discussion of general school matters such as teaching duties, school events, the school program, school policies, and students.

Socialization. Socialization refers to the informal relationships with fellow staff members which occur during the course of the school day, or before and/or after school hours.

Reliance. Reliance refers to the willingness of a member to rely on another member or members of the staff.

Attributed influence. The influence which is attributed to a member of the organization by another member of the organization is termed attributed influence.

Sociometric technique. This is a technique in which individuals are asked to choose each other on a given criterion.

Definitions - Operational

Influential. Influentials were defined as that one-fifth of the staff members who received the largest weights on a given dimension. Should two or more members have been tied in weights so that the number of influentials would have exceeded one-fifth of the total staff, these latter members were dropped from the category so that in any case no more than one-fifth of the total staff was considered influential. This was done to prevent the number of influentials for a given dimension in a given school from becoming excessively large.

Specific influential. An individual who is an influential as defined above, specific to a given dimension, is referred to as a specific influential on that dimension.

Generalized influential. A generalized influential is an individual who has been classified as a specific influential on any four or more of the following dimensions: communication, the three reliance dimensions, and attributed influence.

Subgroup. A subgroup consists of three or more individuals who interact with each other, as identified by

direct factor analysis of the cubed reciprocated choice matrix, varimax rotation (5, p. 28).

Hypotheses

The following hypotheses were formulated with reference to the influence structure and subgroup formation in the school.

1. There is a relationship between an individual being classified as an influential on any of the task area dimensions and his personal characteristics.

Hypothesis 1.1. Influentials will tend to be older than is the average staff member. Congreve (9) found that individuals in power positions in the schools of his study were generally older. Older teachers will in most cases also have more teaching experience which could influence other teachers to consider them as influential.

Hypothesis 1.2. Influentials will have more years of total teaching experience than will non-influentials.

Hypothesis 1.3. Influentials will have longer experience in their particular school than non-influentials. Because of their longer experience in the school, there is a strong probability that they will know the school system better than do other teachers. As a result of this added knowledge gained from experience in the school, other teachers might well consider them as sources of information

and help. Congreve (9) found the individuals who occupied power positions in the school to have longer experience in that school.

Hypothesis 1.4. Influentials will have more years of teacher training than non-influentials. Both Congreve (9) and House (15) found this to be the case in their studies. It seems to be characteristic of our society for others to defer to those with more training.

Hypothesis 1.5. Influentials will tend to be teaching at a higher grade level than non-influentials. It appears that traditionally teachers teaching the higher grade levels have had more prestige. It therefore appears reasonable to assume that other teachers on staff will consider teachers at the upper grade levels to be more prestigious and influential.

Hypothesis 1.6. Influentials will tend to be of the male sex.

2. Individuals who are influential on any of the five task area dimensions will rate higher on various satisfaction measures than will non-influentials. It is reported by Cartwright that if a person is aware of his ranking in a group according to prestige, it will influence his behavior (7, p. 652). Thus it follows that an individual classed as an influential should be more satisfied with the school

than other staff members. The following sub-hypotheses derived logically from the above theorizing.

Hypothesis 2.1. Influentials will consider their school more effective than do non-influentials in educating its students.

Hypothesis 2.2. Influentials will be more satisfied than non-influentials with all aspects of their teaching or working situation.

3. Individuals who hold administrative positions in the school such as those of principal or vice-principal will be influential in each of the task area dimensions. Individuals in administrative positions are generally held to be more responsible for the accomplishment of the organization's goals than are other workers. House found that the principal and vice-principal were influential on nearly all of twelve task topics related to the work of the school (15, pp. 113-118). It seems reasonable to assume that persons engaged in the administration of the school will be more influential than classroom teachers.

4. The principal in each school will be a generalized influential. Principals are expected to be educational "leaders" and are more concerned that the

school performs its functions than any other individuals on staff.

5. An individual who is influential on one task area dimension will tend to be influential on the other task area dimensions as well, as the five task area dimensions are similar in that they all relate to the accomplishment of the school's goals. House found that on the three task areas most directly related to teaching there were seven influentials on a thirty-eight member staff, but five of these were influential on each of the three task areas (15, pp. 100-105).
6. The membership of the socialization subgroups will differ from the communication subgroups in a given school. Socialization subgroups are concerned mainly with group maintenance whereas communication subgroups are concerned more with goal achievement. Bezeau (4) found that staff members discussed matters related to the school and teaching with people different from those with whom they socialized. It was hypothesized earlier that individuals engaged in administration would be influential on the five task area dimensions; these dimensions relate chiefly to the achievement of the school's goals. House found the principal and vice-principal to have very few social links,

that is, they were remote from that part of the structure having to do with group maintenance (15, p. 161).

7. Members of a subgroup will have a number of similar characteristics. These characteristics might be similarity of age, years of training, grade level taught, or a longer number of years of teaching experience in the same school. Hare suggested four factors which contribute to the development of close interpersonal relations (13, pp. 139-141). Among these factors were similar individual characteristics and similar personality. Iannaccone (16) found that the five subgroups within the school he studied showed similarity of characteristics as to age, grade level taught, teaching area, room assignment, and similarity of attitudes. The following sub-hypotheses were derived from the above reasoning.

Hypothesis 7.1. Members of a subgroup will be similar in age.

Hypothesis 7.2. Members of a subgroup will have a similar number of years of total teaching experience.

Hypothesis 7.3. Subgroup members will have a similar amount of length of experience in their school.

Hypothesis 7.4. Subgroup members will have a similar number of years of teacher education.

Hypothesis 7.5. Subgroup members will be teaching at a similar grade level in their school.

Hypothesis 7.6. Members of a subgroup will be mainly from one sex. That is, a subgroup will be composed of either chiefly males or females.

BIBLIOGRAPHY FOR CHAPTER II

1. Argyris, Chris. "The Individual and Organization: Some Problems of Mutual Adjustment," Administrative Science Quarterly, II (1957), pp. 1-24.
2. Argyris, Chris. Understanding Organizational Behaviour. Homewood, Ill.: The Dorsey Press, Inc., 1960.
3. Barnard, Chester I. The Functions of the Executive. Cambridge, Mass.: Harvard University Press, 1938.
4. Bezeau, Lawrence. "The Instrumental-Expressive Dichotomy in School Staffs." Unpublished M. Ed. thesis, University of Alberta, 1966.
5. Blocker, C. E., R. H. McCabe, and A. J. Prendergast. A Method for the Sociometric Analysis of the Informal Organization Within Large Work Groups. Austin, Texas, 1964.
6. Blum, Richard. The Study of Groups. Washington, D.C.: George Washington University, 1953.
7. Cartwright, D. and A. Zander (eds.). Group Dynamics: Research and Theory, Second Edition. New York: Harper and Row, Publishers, 1960.
8. Charters, W. W. "An Approach to the Formal Organization of the School," in D. E. Griffiths (ed.). Behavioral Science and Educational Administration. Chicago: The National Society for the Study of Education, 1964. pp. 243-261.
9. Congreve, Willard J. "Administrative Behaviour and Staff Relations," Administrator's Notebook, VI (Oct. 1957).
10. Dubin, Robert. The World of Work. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1958. pp. 61-76.
11. Festinger, Leon, S. Schachter, and Kurt Back. Social Pressures in Informal Groups. Stanford, Cal.: Stanford University Press, 1950.
12. Griffiths, D. E., D. Clark, R. Wynn, and L. Iannaccone. Organizing Schools for Effective Education. Danville, Ill.: Interstate Publishers and Printers, Inc., 1961.

13. Hare, A. Paul. A Handbook of Small Group Research. Glencoe, Ill.: The Free Press, 1963.
14. Hare, A. Paul. "A Study of Interaction and Consensus in Different Sized Groups," American Sociological Review, XVII (1952), pp. 261-267.
15. House, John H. "An Analysis of Interpersonal Influence Relations," Unpublished Ph. D. thesis, University of Alberta, 1966.
16. Iannaccone, Lawrence. "The Social System of an Elementary School Staff." Unpublished Ed. D. thesis, Teachers' College, Columbia University, 1958, reported in D. E. Griffiths, D. Clark, R. Wynn, and L. Iannaccone. Organizing Schools for Effective Education. Danville, Ill.: Interstate Publishers and Printers, Inc., 1961.
17. Iannaccone, Lawrence. "An Approach to the Informal Organization of the School," in D. E. Griffiths (ed.). Behavioral Science and Educational Administration. Chicago: The National Society for the Study of Education, 1964. pp. 223-242.
18. Jensen, Gale E. "The School as a Social System," Educational Research Bulletin, XXXIII (February, 1954), pp. 38-46.
19. Lundberg, G. A., C. C. Schrag, and O. N. Larsen. Sociology, Third Edition. New York: Harper and Row, 1963.
20. Mazlow, A. H. Motivation and Personality. New York: Harper and Brothers, 1954. pp. 80-106.
21. McCleary, Lloyd E. "A Study of Interpersonal Influence Within a School Staff." Unpublished Ed. D. thesis, University of Illinois, 1957.
22. Miklos, Erwin. "Some Aspects of the Social Structure of a School," in F. Enns (ed.). The Tasks of the Principal. Edmonton: Policy Committee, Leadership Course for School Principals, 1963. pp. 21-29.
23. Roethlisberger, F. J. and W. J. Dickson. Management and the Worker. Cambridge: Harvard University Press, 1956. Chapter 23.

24. Slater, Philip E. "Role Differentiation in Small Groups," in A. Paul Hare, E. F. Borgatta, and R. F. Bales (eds.). Small Groups: Studies in Social Interaction. New York: Alfred A. Knopf, 1961. pp. 498-515.
25. Stewart, R. The Reality of Management. London: Wm. Heineman, Ltd., 1963.
26. Weber, Max. "Essentials of Bureaucratic Organization: An Ideal Type Organization," in R. K. Merton et al. Reader in Bureaucracy. Glencoe, Ill.: The Free Press, 1952. pp. 18-27.

CHAPTER III

INSTRUMENTATION AND DATA COLLECTION

This chapter describes the instrument used and its administration, and discusses a few characteristics of the sample. The problems of reliability and validity are also dealt with.

The Instrument

Data for the study were gathered earlier as a part of a larger study, by means of a questionnaire, which is found in Appendix A. The questionnaire consisted of three sections. Section A consisted of six sociometric questions in which the respondent indicated his choices as to whom he interacted with on each of the dimensions referred to earlier. Section B consisted of five multiple choice questions relating to the degree of satisfaction in the school for each member on various measures. Section C dealt with personal variables such as age, sex, years of training, grade level taught, position held, and so on.

The questionnaire was administered in eighteen schools in rural north central Alberta. The questionnaire was administered by a researcher to all of the members of the staff at a common time such as during the staff meeting or the lunch hour. Respondents were given a copy of the

questionnaire as well as a numbered list of their school's staff members. They completed the questionnaire independently of each other, and the researcher was present to answer any questions which might have arisen.

The sample included eighteen schools or all those of the original twenty-six that responded favorably to the request for the study to be made. Schools included some in each of the following organizational levels: elementary, junior high, senior high, elementary-junior high, junior-senior high, and those offering grades one through twelve. A classification of the types of schools in the sample by grade levels is given in Table I. A total of 389 staff members completed questionnaires. This total included teachers, those engaged in administration, secretaries, librarians, and counsellors. The size of the staff in the eighteen schools varied from fourteen to thirty-three members. A classification of the size of schools is given in Table II.

Description of the Sample

Of the 389 teachers in the sample, 148 were male and 238 were female. Three members did not indicate their sex. Teachers ranged all the way from twenty to seventy-seven years of age, with teachers in their twenties being more common than other age groups. Table XXXVII in Appendix B

TABLE I
CLASSIFICATION OF SCHOOLS IN THE SAMPLE BY GRADE LEVELS

Grade levels in school	Number of schools
1 - 6	4
1 - 9	3
1 - 12	4
7 - 9	3
7 - 12	2
10 - 12	2

TABLE II
CLASSIFICATION OF SCHOOLS IN THE SAMPLE BY SIZE OF STAFF

Size of staff	Number of schools
14 - 17	7
18 - 21	4
22 - 25	1
26 - 29	3
30 - 33	3

classifies the teachers in the sample by age.

Two-fifths of the teachers had less than ten years of total teaching experience; another third had between ten and nineteen years of experience. Over one-fourth of the sample, or 103 persons, were teaching in their first year in their present position. A classification of the sample as to total teaching experience and experience in the present school is given in Tables XXXVIII and XXXIX in Appendix B.

Thirty per cent of the sample had one year of teacher education; this amount of training was more common than any other in the study. The next most common amount was four years of teacher education, with twenty-three per cent of the sample in this category. Table XL in Appendix B gives the distribution of years of teacher education for the sample while Table XLI shows the grade levels at which teachers in the sample spent most of their teaching time.

Reliability and Validity

Lindzey and Borgatta report that when sociometric choices are cast in a matrix, as they were in this study, the interpretive reliability will be high, that is, two different researchers will get very similar results with the same data (1, pp. 420-424). This is not the case when

sociograms are used. Test reliability of sociometric measures is difficult to assess because human groups are to some extent constantly undergoing changes in their internal composition. However, Selltiz et al. (2, p. 269) state the following:

Studies of the reliability of sociometric data, on the basis of repeated tests, indicate that although there may be considerable variation in specific choices, patterns of group interaction and various scores or indices derived from the data are quite stable.

Since this study is particularly concerned with patterns of group interaction, the question of reliability was not considered serious.

The responses to the questionnaire were limited to written, interpersonal choices, in which no demonstration of validity is necessary according to Lindzey and Borgatta (1, pp. 420-424). No restriction was placed on the number of choices a respondent could make on a given dimension. Restricting the number of responses to a question is a technique sometimes questioned by sociometricians.

On the first two dimensions of the questionnaire which were sociometric, namely communication and socialization, only reciprocated choices were used, for purposes of validating such interaction. In other words, if a staff member nominated a colleague as one with whom he regularly discussed school affairs and the second staff member in

turn nominated the first, the interaction was reciprocated and was accepted as being validated.

Reciprocated choices were not used on any of the reliance dimensions or the attributed influence dimension, however. Reliance data represent members' perceptions of whom they would rely upon, and there is no apparent way to verify the members' perceptions of their future actions. In both communication and socialization reciprocation can more logically be taken to be verification of such action. In the matter of attributed influence there does not need to be mutual choice; it is unidirectional by definition so that reciprocation is not logical.

BIBLIOGRAPHY FOR CHAPTER III

1. Lindzey, G. and E. T. Borgatta. "Sociometric Measurement," G. Lindzey (ed.). Handbook of Social Psychology. Reading, Mass.: Addison-Wesley Publishing Company, Inc., 1954.
2. Selltitz, Claire, M. Jahoda, M. Deutsch, and S. W. Cook, Research Methods in Social Relations. New York: Holt, Rinehart and Winston, 1965.

CHAPTER IV

APPLICATION OF MATRIX OPERATIONS TO THE DATA

This chapter traces the development of sociomatrices and the mathematical operations to which these are frequently subjected. Matrix multiplication and the reliance weighting method used for purposes of defining influentials are described in detail, and some problems and limitations mentioned. An actual example of the method used is shown as applied to one school on the communication dimension and one of the reliance dimensions. The application of factor analysis to group structure is also described, and applied to one school.

Development of Sociomatrix Techniques

Sociometry was originated by Moreno (16) and first described in his book Who Shall Survive? in 1934. His method involved the graphical display through sociograms of choices and rejections between people on a given criterion. Sociograms have the disadvantage in that they can be confusing to the reader, especially if the number of subjects involved is large. Sociograms are built by a process of trial and error, and as a result different researchers using the same data may depict different sociograms.

A more objective method of presenting sociometric data from a questionnaire is by means of a sociomatrix. Among the first researchers to use this method was Forsyth and Katz (9), who in 1946 suggested the rearrangement of a matrix of rows and columns to cluster positive choices around the main diagonal (which runs from the upper left to the lower right) in order to detect subgroups. In 1947 Beum and Criswell (2) suggested the use of IBM punched cards used with card sorters and tabulators to speed the analysis of data in sociomatrix form. Festinger together with Perry and Luce (8) advanced the application of matrix algebra to sociomatrices in 1949. A method was described to determine cliques of three or more members who chose each other mutually from the elements in the main diagonal of the cubed matrix. In 1950 Beum and Brundage (1) advocated the rearrangement of matrix rows and columns to maximize the principal diagonal, or in other words, to minimize the square of the perpendicular deviations of the numbers from the main diagonal of the matrix. In the same year Katz (13) advanced Beum and Criswell's punched card technique by suggesting the use of one card per individual containing all his choices for each sociometric question.

In 1955 Weiss and Jacobson (17) reported the method they used to identify work groups in a complex organization of 196 persons. The method followed the guidelines

proposed by Festinger (8) and Forsyth and Katz (9) but was adapted to an IBM punching and listing procedure. Harary and Ross (11) in 1957 extended Festinger's approach of clique detection through the use of set theory. In 1960 Coleman and MacCrae (6) suggested a method of subgroup detection through the use of the Univac computer. The computer program selected mutual choices from sociometric data and permuted rows and columns of the sociomatrix so as to group mutual choices near the main diagonal. This was similar to the Beum and Brundage (1) approach to subgroup determination, but much faster in that it lent itself to computer processing. They indicated that limitations of the program were the failure to detect many subgroups and cliques clearly, and that the permutation superposed unconnected subgroups without discriminating them from one another.

Sociometric techniques have also been applied to schools. In 1947 Cooper (7) suggested three uses of sociometry for school administrators. These were in the realm of the study of concepts such as social groups, as a measurement device in administrative practice, and as a research tool in school administration. McCleary (15) was one of the first researchers to study a school staff sociometrically. He raised the reciprocated matrix to the second and third powers in order to determine the influence

structure in a high school. McCleary suggested the analysis of complex organizations through the use of matrix operations.

Three approaches seem possible in the determination of subgroups. These are the use of sociograms, permutation of rows and columns of the sociomatrix to maximize the principal diagonal, and factor analysis. Sociograms have at least three limitations, which were already mentioned in this chapter. The method of permuting rows and columns is very tedious, especially for large groups, and the method does not always clearly define subgroups (1) (6). This leaves the third approach, factor analysis, which is discussed later.

The Communication Sociomatrix

The method of matrix multiplication and its significance will be explained by its application to School 3 in the sample on the communication dimension ($QN = 1$). The actual matrices are shown in Figures 1 through 4. Festinger indicates that the method of matrix multiplication applied to original sociometric choices may be used to study relationships of influence, communication, or other criteria (8, p. 155). In this study the method was used to determine those staff members in schools considered influential as chosen by fellow staff members on

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0
2	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0
3	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6	1	0	0	0	0	0	1	1	0	1	1	0	0	0	1	0
7	1	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0
8	1	0	0	0	0	1	1	0	0	1	0	0	1	1	1	1
9	0	0	1	0	0	1	1	1	0	1	0	0	0	0	0	0
10	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0
11	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0
12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
13	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

RCW SUMS SCHCOL = 3 QN = 1

COLUMN OR ROW NUMBER-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SUM OR ELEMENT VALUE-	4	3	9	0	1	6	6	8	5	4	4	1	2	0	4	1

THE SUM OF ALL THE MATRIX ELEMENTS IS 58.

RANKED COLUMN SUMS SCHCOL = 3 QN = 1

RANK-----	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COLUMN OR ROW NUMBER-	10	6	11	8	15	7	1	3	9	12	13	14	16	2	4	5
SUM OR ELEMENT VALUE-	12	9	6	5	5	4	3	3	3	3	2	2	1	0	0	0

THE SUM OF ALL THE MATRIX ELEMENTS IS 58.

FIGURE 1

UNRECIPROCATED COMMUNICATION SOCIOMATRIX

FOR SCHOOL 3

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RCW SUMS = 3 SCHOOL = 1

RCW OR ELEMENT VALUE-
COLUMN OR ROW NUMBER-

THE SUM OF ALL THE MATRIX ELEMENTS IS 28.

RAKKEE COLUMN SUMS = 3 SCHOOL = 1

RAKKEE-----
COLUMN OR ROW NUMBER-
RCW OR ELEMENT VALUE-

THE SUM OF ALL THE MATRIX ELEMENTS IS 28.

the communication, attributed influence, and reliance dimensions. Influentials were determined on the basis of those individuals having the largest number of three-step connections as shown in the cubed matrix. The method has been applied to single schools in studies by McCleary (15) and House (12) and to a number of junior colleges by Blocker (3).

The original matrix for School 3 on communication is shown in Figure 1. This is a 16 x 16 matrix indicating the choices of sixteen staff members in this school. Choices made by an individual appear in a row of the matrix and choices received by him appear in a column of the matrix. Thus Person 1 (P1) chose Persons 6, 10, 11, and 15 while Persons 6, 7, and 8 chose Person 1. Where P1 did not choose an individual, the element zero appears in the cell corresponding to the column number of that individual. Only mutual choices were considered between individuals on the communication and socialization dimensions for purposes of validating such interaction, thus the matrix was reduced to show only reciprocated choices and is shown in Figure 2. An individual was not considered as having chosen himself, and all elements in the main diagonal were set to zero. This matrix of mutual choices, or reciprocated matrix, is symmetrical about the main diagonal.

Whereas P1 chose P6, P10, P11 and P15 on the original matrix, the first row of the reciprocated matrix shows that

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	0	0	0	0	0	1	1	0	1	1	0	0	0	1	0
7	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0
9	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
10	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0
11	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RCW SUMS SCHCOL = 3 QN = 1

COLUMN OR ROW NUMBER-	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SUM OR ELEMENT VALUE-	1	0	3	0	0	6	2	3	2	4	3	0	0	0	2	0

THE SUM OF ALL THE MATRIX ELEMENTS IS 26.

RANKED COLUMN SUMS SCHCOL = 3 QN = 1

RANK-----	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COLUMN OR ROW NUMBER-	6	10	3	8	11	7	9	15	1	2	4	5	12	13	14	16
SUM OR ELEMENT VALUE-	6	4	3	3	3	2	2	2	1	0	0	0	0	0	0	0

THE SUM OF ALL THE MATRIX ELEMENTS IS 26.

FIGURE 2

RECIPROCATED COMMUNICATION SOCIOMATRIX

FOR SCHOOL 3

1 = 78.7 T = 100422 2402.430

- ELEMENT VALUE
- ELEMENT OR NAME

21 JUL 1964 0000Z

1 = 00 3 = 00100 2402 441103 030000

NAME _____
ADDRESS OR BOX NUMBER _____
CITY OR ELEMENTARY SCHOOL _____

THE SUM OF ALL THE PARTS IS 100

the only mutual choice P1 had was P6. P6 however had mutual choices with P1, P7, P8, P10, P11 and P15. The ranked column sums below the matrix indicate each individual's column totals from the highest to the lowest and his rank in the group. For example, the first entry indicates that P6 had the largest number of choices, six, and that he ranked first in the group. The last statement below this matrix indicates that there were a total of twenty-six "1" entries, or mutual choices, in the matrix.

The squared or second power matrix is found in Figure 3 and results from multiplying the symmetric matrix of Figure 2 by itself. Each element in the cells of the squared matrix represents the number of two-step connections that exist between two given members of the group on the specified criterion. For example, the two in cell (3, 6) indicates that P3 has chosen two individuals who have chosen P6. The row for each individual gives information as to whom the individual is connected with by two-choice paths, or in other words, gives information as to the number of people who have been chosen by that individual who have also chosen the second individual.

Unlike the original matrix, the squared matrix does have non-zero elements in the major diagonal cells and these are of particular interest. These values represent the number of mutual choices that the particular individual had

	1	2	3	4	5	6	7	8	9	0	11	2	3	4	5	16
1	1	0	0	0	0	0	1	1	0	1	1	0	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	2	0	0	1	2	1	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	2	0	0	6	1	2	1	1	1	0	0	0	1	0
7	1	0	0	0	0	1	2	1	0	1	1	0	0	0	2	0
8	1	0	0	0	0	2	1	3	0	1	1	0	0	0	1	0
9	0	0	1	0	0	1	0	0	2	1	2	0	0	0	0	0
10	1	0	2	0	0	1	1	1	1	4	2	0	0	0	1	0
11	1	0	1	0	0	1	1	1	2	2	3	0	0	0	1	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	0	0	0	0	1	2	1	0	1	1	0	0	0	2	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FIGURE 3

SECOND POWER COMMUNICATION MATRIX

FOR SCHOOL 3

(5, p. 135). Cell (1,1) indicates that P1 had one mutual choice. An examination of the original matrix reveals that this was from P1 to P6 and from P6 to P1. Cell (10,10) indicates that P10 had four mutual choices. Since the original symmetric matrix was squared, the second power matrix is also symmetrical.

The cubed matrix for School 3 on communication is shown in Figure 4. The element values in the cubed matrix indicate the number of three-step connections that exist between any two people. The element eight in cell (7,6) indicates that P7 had eight three-step connections through two other people to P6, or connections of the type A to B to C to D where A and D represent P7 and P6 respectively, in this example.

Festinger (8) described how subgroups of three or more individuals who mutually choose each other, or cliques, may be identified from the non-zero elements in the main diagonal of the cubed matrix. The cubed matrix for School 3 represents one of the smaller schools in the study and subgroup detection in it using Festinger's method would be relatively simple as compared to those schools having thirty or more staff members. Such groups are hardly amenable to manipulation by this method and require other methods of treatment.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	2	0	0	6	1	2	1	1	1	0	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2	0	4	0	0	3	2	2	5	7	7	0	0	0	2	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	6	0	3	0	0	6	8	8	3	10	9	0	0	0	8	0
7	1	0	2	0	0	8	2	5	1	2	2	0	0	0	2	0
8	2	0	2	0	0	8	5	4	1	3	3	0	0	0	5	0
9	1	0	5	0	0	3	1	1	2	6	3	0	0	0	1	0
10	1	0	7	0	0	10	2	3	6	6	7	0	0	0	2	0
11	1	0	7	0	0	9	2	3	3	7	4	0	0	0	2	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	0	2	0	0	8	2	5	1	2	2	0	0	0	2	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RANKED COLUMN SUMS SCHOOL = 3 QN = 1

RANK-----	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COLUMN OR ROW NUMBER-	6	10	11	3	8	7	15	9	1	2	4	5	12	13	14	16
SUM OR ELEMENT VALUE-	61	44	38	34	33	25	25	23	15	0	0	0	0	0	0	0

THE SUM OF ALL THE MATRIX ELEMENTS IS 298.

FIGURE 4

THIRD POWER COMMUNICATION MATRIX

FOR SCHOOL 3

The Determination of Influentials on Communication

Influentials on the communication dimension were determined from the column totals of the cubed matrix according to the definition on page twenty-seven. For School 3 which had sixteen staff members this meant that a maximum of three staff members could be termed influential, and these were P6, P10, and P11 as identified from the totals below the cubed matrix.

An examination of the column totals for all schools on communication revealed that there was little difference in the order of ranking between the original reciprocated matrix and the cubed matrix for those individuals who ranked highest. However, with the definition used applied to the original reciprocated matrix there would have been a total of only thirty-two influentials in communication in place of the present seventy-seven in all schools. This was due to the fact that after the first one or two highest ranking individuals there were many who were tied in rank, and thus omitted from the influentials in communication. This was also true for the socialization dimension, though to a lesser extent. The total of seventy-seven influentials on communication from the cubed matrix was a good approximation to one-fifth of the total sample, and in keeping with the definition and therefore used.

Defining an influential so that a maximum of

one-fifth of the school's staff members could be included in the category brought about a fairly good separation between influentials and non-influentials. That is, there was a fairly wide discrepancy between the last person included as an influential, and the first person not included, even though this is not the case with School 3 on communication. This fairly wide discrepancy in weights between those included and those excluded as influentials seemed to be particularly the case for the three reliance dimensions in many of the schools. The discrepancy was not evident in attempting to define influentials on the basis of the first order matrix on communication and socialization, as indicated above. Furthermore, it was felt that the values in the cubed matrix were the best representation of relationships in the system. This is consistent with the thinking of Festinger (8) who maintained that the values in the cubed matrix cells were reliable measures of communication relationships between members. The number of influentials in each school on each dimension is shown in Table III. The socialization dimension was handled in precisely the same way as the communication dimension.

The Reliance Weighting Method

Of the three reliance dimensions, the first dealt with reliance concerning discipline, the second concerned

TABLE III
NUMBER OF INFLUENTIALS FOR EACH SCHOOL
ON EACH DIMENSION

School No.	No. of Staff	Number of influentials					
		Comm.	Soc.	Rel.1	Rel.2	Rel.3	Att. Infl.
1	29	6	6	3	3	5	5
2	19	4	3	4	4	3	3
3	16	3	2	2	3	2	3
4	20	4	4	2	4	2	4
5	14	3	3	3	3	3	3
6	33	7	7	7	7	6	4
7	20	3	4	3	2	4	3
8	29	5	6	6	5	5	5
9	15	4*	2	2	3	2	2
10	17	3	3	3	2	3	3
11	25	5	5	4	4	5	5
12	19	4	4	4	4	3	4
13	28	5	6	6	6	5	5
14	30	6	6	4	6	5	6
15	16	3	3	3	3	3	2
16	30	6	6	3	6	6	6
17	15	3	2	3	3	3	3
18	14	3	3	3	3	2	3
Totals	389	77	75	65	71	67	69

*The regular definition revealed only one influential so that a Kolmogorov-Smirnov test could not be carried out within the school. An adjustment was made to include the next three individuals who were tied in rank.

reliance as to the organization of teaching materials, teaching methods, tests, and assignments, and the third dimension was concerned with reliance as to interpretation of school policies and regulations. The matrices for the third reliance dimension ($QN = 5$) are shown in Figures 5 through 7. The data for the three reliance dimensions were treated in the same way.

Two basic differences exist between the data for the communication and socialization dimensions and the data for the reliance dimensions which affected the development of the reliance weights. In communication, the data involved communication links through which information could flow in either direction. The data represented existing communication links as verified by the reciprocated choice method. Reliance data represented members' perceptions of whom they would rely upon, for which there seemed to be no apparent way to verify members' future actions. For example, if X relies upon Y but Y does not reciprocate, a reliant relationship still exists, even though it is only a one-way link. Hence the reliance links were considered as uni-directional, and reliance choices were not always reciprocated.

Choices for each reliance dimension were recorded in a matrix in which each member was represented by a row and a column. An examination of the matrix in Figure 5 indicates all of the one-step reliance links and their directions.

SCHOOL = 5 QN = 5
 FIRST POWER MATRIX

	1	2	3	4	5	6	7	8	9	0	11	2	3	4
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	1	1	1	0	0	0	0	0	0	0	0	0	0
6	0	1	0	1	0	0	0	0	0	0	0	0	0	0
7	0	1	0	1	0	0	0	0	0	0	0	0	0	0
8	0	1	0	1	0	0	0	0	0	0	0	0	0	0
9	0	1	0	0	0	0	0	0	0	0	0	0	0	0
10	0	1	0	1	0	0	0	0	0	0	0	0	0	0
11	0	1	0	1	0	0	0	0	0	0	0	0	0	0
12	0	1	0	1	0	0	0	0	0	0	0	0	0	0
13	0	1	0	1	0	0	0	0	0	0	0	0	0	0
14	0	1	0	1	0	0	0	0	0	0	0	0	0	0

SCHOOL = 5 QN = 5
 RANKED RELIANCE SUBWEIGHTS

RANK-----	1	2	3	4	5	6	7	8	9	10	11	12	13	14
COLUMN OR ROW NUMBER-	2	4	1	3	5	6	7	8	9	10	11	12	13	14
SUM OR ELEMENT VALUE-	13	11	2	2	1	1	1	1	1	1	1	1	1	1

FIGURE 5

FIRST POWER MATRIX FOR SCHOOL 5

ON RELIANCE 3

Sums of columns indicate the number of members who relied upon a given member, and include the individual's reliance upon himself. Two-step and three-step channels of reliance were developed by squaring and cubing the original matrix. The cubed matrix for the third reliance dimension for School 5 is shown in Figure 6. A value in cell (x,y) of the squared matrix indicates the number of two-step reliance channels of X on Y. Members who would rely on Y appear in the original matrix. Those members who would rely on those who rely on Y appear in the squared matrix. Those members who would rely on those who appear in the squared matrix appear in the cubed matrix, which indicates the three-step reliance channels. The sum of the columns in the cubed matrix reveals the total number of three-step reliance links through which members relied on the member indicated by that column.

The most important consideration in assigning reliance weights to members was the relative reliance value of those members who would rely on the member being considered. For example, if member X was relied on by only one member, but that member was highly influential, then in terms of reliance influence member X should rank high. Therefore a reliance subweight was assigned to each member. A procedure similar to that described by Blocker et al. was adopted:

SCHOOL = 5 QN = 5
CUBED RELIANCE MATRIX

	1	2	3	4	5	6	7	8	9	0	11	2	3	4
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0
5	1	1	0	1	0	0	0	0	0	0	0	0	0	0
6	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7	1	1	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1	0	0	0	0	0	0	0	0	0	0	0	0
12	1	1	0	0	0	0	0	0	0	0	0	0	0	0
13	1	1	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1	0	0	0	0	0	0	0	0	0	0	0	0

FIGURE 6

CUBED MATRIX FOR SCHOOL 5
ON RELIANCE 3

The subweight for X was equal to the number of members who relied directly on X (primary reliance scope) plus one; the one was added as a value for X himself. The subweights of all of the persons in the tertiary reliance net of each member were then summed; this was the reliance weight of the members.

The computation of the weights was done first by summing the columns of the original reliance matrix and adding one to each column total; the results were the subweights. The subweight of Member X was then substituted in row x of the cubed reliance matrix wherever any value appeared. When this had been done for all members, the columns of the cubed reliance matrix were summed. The column sums were the reliance weights (3, pp. 30-31).

The subweights for each member on Reliance 3, School 5, are shown below the matrix in Figure 5. Substitution of subweights in rows of the cubed matrix where non-zero values appeared is shown in Figure 7. For example, cell (2,2) contains the value thirteen which is P2's subweight. Column sums referred to in the above quotation were not used as reliance weights however, as some adjustment was required. The reliance weights shown in Figure 7 are those arrived at after adjustment. Adjustment of the original reliance weights was deemed advisable, as after inspection of a number of matrices the same problem was encountered as that mentioned by Blocker:

The weighting system needed some adjustment. The system did distinguish those persons who were influential because of a reliance link with a few influentials. However, the system tended to place the most influential member below those on whom he relied. This was due to the subweight substitution method which is still considered to be basically sound by the author. The problem can be solved by adding each member's own subweight to his total. This would have the effect of

SCHOOL = 5 QN = 5
 CUBED RELIANCE MATRIX WITH SUBSTITUTED SUBWEIGHTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	3	0	0	0	0	0	0	0	0	0	0	0
3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	1	0	0	0	0	0	0	0	0	0
5	1	1	0	1	0	0	0	0	0	0	0	0	0	0
6	1	1	0	0	0	0	0	0	0	0	0	0	0	0
7	1	1	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1	0	0	0	0	0	0	0	0	0	0	0	0
12	1	1	0	0	0	0	0	0	0	0	0	0	0	0
13	1	1	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1	0	0	0	0	0	0	0	0	0	0	0	0

RELIANCE WEIGHTS	SCHOOL NUMBER = 5					QUESTION NUMBER = 5								
RANK-----	1	2	3	4	5	6	7	8	9	10	11	12	13	14
COLUMN OR ROW NUMBER-	2	4	1	3	5	6	7	8	9	10	11	12	13	14
SUM OR ELEMENT VALUE-	35	23	16	2	1	1	1	1	1	1	1	1	1	1

FIGURE 7

CUBED MATRIX WITH SUBSTITUTED SUBWEIGHTS

FOR SCHOOL 5 ON RELIANCE 3

allowing a bonus for primary links, while not losing the advantage of pointing out those persons with a few important reliance links (4, p. 107).

The reliance weights which were used are those after application of the above correction, and it is these which are shown in Figure 7. An examination of the corrected reliance weights for a number of schools indicated that the problem was overcome satisfactorily. Influentials were then defined on the basis of that one-fifth of staff receiving the highest reliance weights, having regard to the limitations imposed by the definition.

The Attributed Influence Dimension

Data for the attributed influence dimension could not be expanded as they were for the other dimensions, since the way in which the question was asked implied a very direct relationship. If an individual attributes influence to a staff member, that staff member is influential by virtue of the regard the individual has for him directly and not through two- or three-step connections through other people. Hence the attributed influence weight of each member was computed by summing the columns of the original attributed influence matrix, and influentials on this dimension chosen as those ranking in the top fifth, having regard to the limitations imposed by the definition.

The Application of Factor Analysis to Subgroup Detection

With the advent of electronic computation devices,

subgroups may be separated from larger groups by means of factor analysis. One of the first records of its application to group structure is given by MacCrae (14) who factor analyzed the friendship choices of sixty-seven prison inmates. He factor analyzed both the matrix of original choices given and the matrix of choices received after inserting unity in the main diagonal cells of each of the matrices to indicate self-choices. This was done under the assumption that members of any group will tend to choose the same persons and in turn be chosen by the same persons. The criterion for subgroup membership was a factor loading of 0.8 on the varimax rotation of the original eigenvectors. By this procedure MacCrae identified eleven subgroups in the total group, and found that there was a high tendency toward reciprocation as there was little difference between choices in the two structures, based on choices given and received.

Blocker (3) identified the subgroups in six American junior colleges by factor analyzing the cubed reciprocated matrix using a principal axis factor analysis technique, varimax rotation. An arbitrary figure of a 0.50 loading was used as a criterion for placing members in a flow of communications.

The procedure used in this particular study was the factor analysis of the cubed reciprocated matrix on the

communication and socialization dimensions. This was different from MacCrae's study (14) in that only reciprocated choices were used; it was felt that the cell values of the cubed matrix were the best representation of relationships in the system and were thus used. This method is akin to that used by Blocker (3, pp. 27-29). A principal axis factor solution, varimax rotation, was used in showing the results of the study, and a criterion of a positive loading of 0.40 or greater used for a member to be in a subgroup.

Before a meaningful result as far as group structure was concerned was arrived at in this study, a number of problems had to be overcome. Individuals were regarded as not choosing themselves in communication and socialization, thus zeros were inserted in the main diagonal of the original matrix, and after reciprocation of choices this matrix was cubed. Two University of Alberta computer programs for factor analysis were available and both were tried, and one of these, Householder's solution, was generally unsuccessful. The program using Hotelling's solution consistently left out the person(s) having the greatest number of links, and very often loaded such an individual highly and positively in a factor all by himself. The approach that eventually worked was the insertion of 1's in the main diagonal of the original reciprocated matrix after which the resulting matrix was cubed. This

approach was strictly utilitarian in that individuals on these dimensions were regarded as not choosing themselves, thus the main diagonal elements in the original matrix had been set to zero. A comparison of the factor analysis results of these matrices with the sociograms which were drawn from the original reciprocated matrix showed them to be in close agreement. One argument for the validity of this factor analysis approach to group structure is that it helps the researcher to draw the more complex sociograms. In this study, after a number of attempts had been made to draw sociograms for some of the larger schools, it had been decided that these were impossible to draw for large schools. However after the factor analysis result was available each of these sociograms was drawn without too much difficulty because the factors now presented a systematic way of attacking the problem.

The factor analysis method used was Hotelling's principal axis solution, varimax rotation. A criterion of a positive factor loading of 0.40 or greater on a factor was selected for a member to be in a subgroup, with at least three of the loadings on a factor having to be +0.40 or greater before the individuals were considered to comprise a subgroup. An eigenvalue of at least 1.000 was used as a criterion for stopping iteration, since the use of this procedure accounted for a major portion of the total

variance in all schools on both dimensions. Table XLII in Appendix B shows the number of factors which met this criterion and were then used in each of the schools on the two desired dimensions, as well as the percentage of the total variance accounted for by these factors. Table IV summarizes the results of Table XLII. Table IV indicates that on communication the classification of schools accounting for given percentages of the total variance is as follows:

90.0 - 100 per cent, eight schools; 80.0 - 89.9 per cent, six schools; 70.0 - 79.9 per cent, three schools; and 65.0 - 69.9 per cent, one school. The number of schools on the socialization dimension in the same classification scheme and in the same order is as follows: six, eight, three, and one. On either of the two dimensions fourteen schools or 77.7 per cent of the schools in the sample had eighty or more per cent of the total variance accounted for when the data were treated in the way described above.

Factor Analysis Results for School 3 on Communication

The original reciprocated matrix for the communication dimension for School 3 was shown in Figure 2 on page fifty-one. The sociogram drawn on the basis of this matrix is shown in Figure 8 on page seventy-one. As was indicated earlier in the present chapter, an adjustment had to be made in this matrix before cubing it for operational

TABLE IV

SUMMARY OF PERCENTAGE OF TOTAL VARIANCE ACCOUNTED FOR
BY THE FACTORS USED IN SCHOOLS

Percent of total variance accounted for	Number of schools on dimension of	
	Communication	Socialization
90.0 - 100.0	8	6
80.0 - 89.9	6	8
70.0 - 79.9	3	3
65.0 - 69.9	1	1

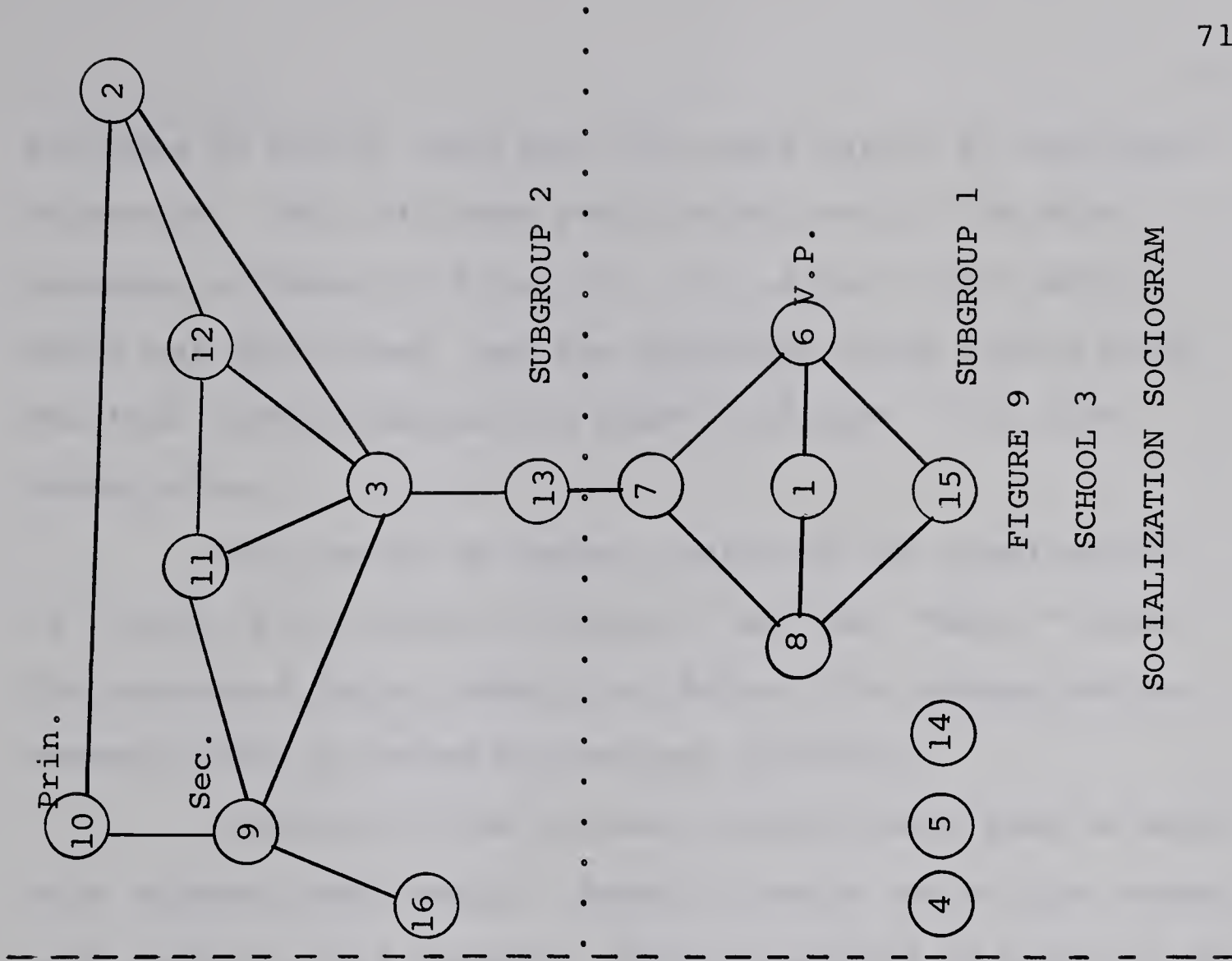


FIGURE 9

SCHOOL 3

SOCIALIZATION SOCIOGRAM

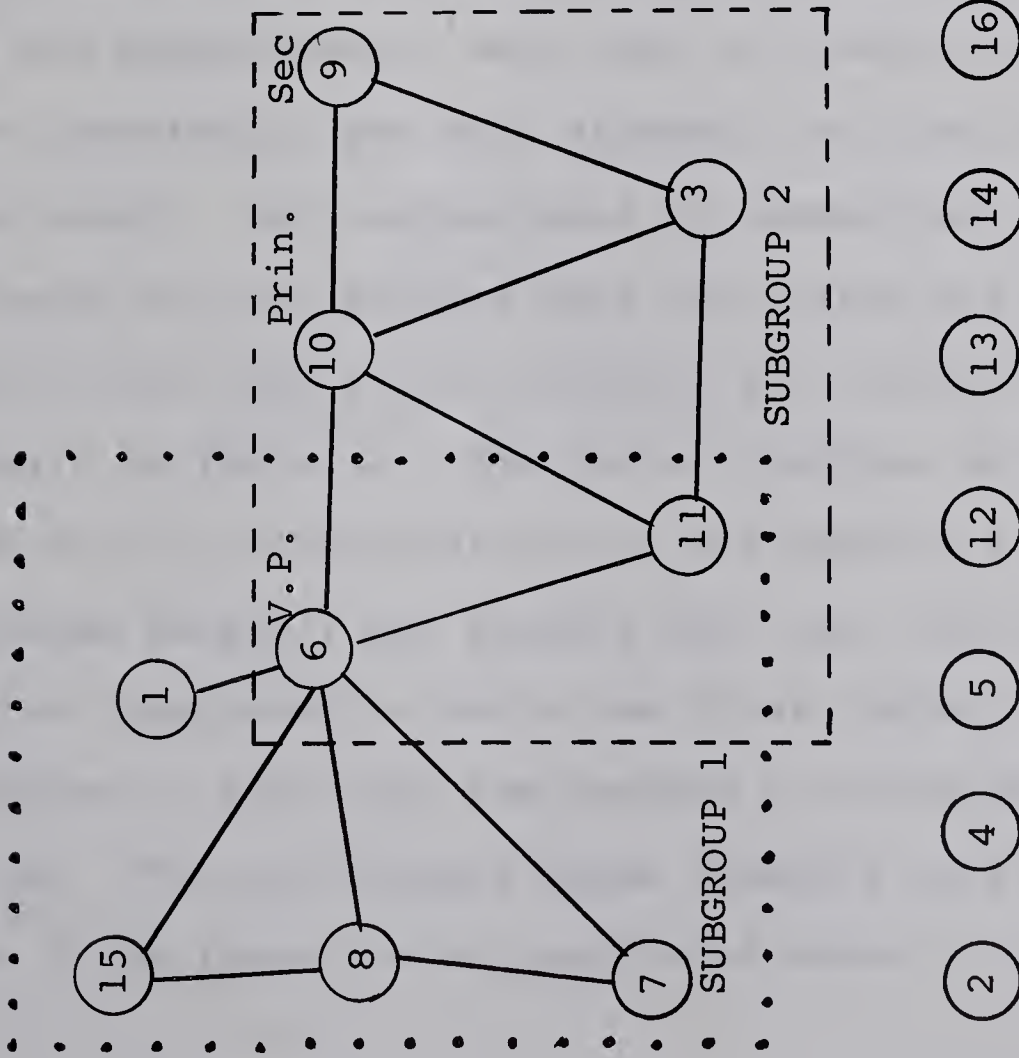


FIGURE 8

SCHOOL 3

COMMUNICATION SOCIOGRAM

purposes of factor analyzing the cubed matrix to determine subgroups. This adjusted matrix with ones in its main diagonal is shown in Figure 10. It is the latter matrix which was then cubed, and the resulting cubed matrix which was then factor analyzed is shown in Figure 11 on page seventy-four.

The results of factor analyzing the cubed matrix of Figure 11 are shown in Tables V and Va. Table V shows the unrotated factor matrix for School 3 on communication whereas Table Va shows the varimax rotation.

Loadings on the varimax rotation were used to determine subgroup membership. School 3 was a senior high school with sixteen staff members. Their responses to question one of the questionnaire were cast in a matrix and reciprocated, 1's inserted in the main diagonal, and the resulting matrix was cubed. All correlations of communication relationships between any two persons were calculated and the correlation matrix was then factor analyzed and rotated to obtain the result in Table Va. The factor loadings of 0.922, 0.333, and 0.057 in the first row of the table are the correlations between Person 1 and factors one, two, and three respectively. P1 is considered to be in the first factor only as his loading on the other two factors is below the criterion of +0.40. The individuals whose loadings were high enough in the first factor to be considered members of the first

SCHOOL = 3 QN = 1
SYMMETRICAL MATRIX - FIRST POWER

	1	2	3	4	5	6	7	8	9	0	11	2	3	4	5	16
1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6	1	0	0	0	0	1	1	1	0	1	1	0	0	0	1	0
7	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
8	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	0
9	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0
10	0	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0
11	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
15	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

FIGURE 10

SCHOOL 3 RECIPROCATED COMMUNICATION MATRIX
WITH ONES IN MAIN DIAGONAL

SYMMETRICAL MATRIX - FIRST POWER
 ORDER = 16
 ORDER = 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Figure 10

Figure 10. Symmetrical Matrix - First Power

Figure 10. Symmetrical Matrix - First Power

SCHOOL = 3 QN = 1
THIRD POWER MATRIX

	1	2	3	4	5	6	7	8	9	0	11	2	3	4	5	16
1	4	0	2	0	0	9	4	5	1	4	4	0	0	0	4	0
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2	0	1	4	0	9	2	2	1	1	6	1	3	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6	9	0	9	0	0	2	5	1	4	1	7	6	1	5	0	0
7	4	0	2	0	0	1	4	9	1	1	5	5	0	0	0	8
8	5	0	2	0	0	1	7	1	1	4	1	6	6	0	0	0
9	1	0	1	1	0	6	1	1	9	1	2	9	0	0	0	1
10	4	0	1	6	0	1	6	5	6	1	2	1	9	1	6	0
11	4	0	1	3	0	0	1	5	5	6	9	1	6	1	4	0
12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
15	4	0	2	0	0	1	4	8	1	1	5	5	0	0	0	9
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

FIGURE 11

SCHOOL 3 CUBED COMMUNICATION MATRIX

ADJUSTED FOR FACTOR ANALYSIS

TABLE V

UNROTATED FACTOR PATTERN MATRIX FOR SCHOOL 3 ON COMMUNICATION

Test No. (Person)	Communalities	Factor		
		1	2	3
1	0.965	0.927	-0.325	0.000
2	0.322	-0.264	-0.015	-0.502
3	0.999	0.728	0.685	0.000
4	0.268	-0.264	-0.015	-0.445
5	0.200	-0.264	-0.015	-0.360
6	0.997	0.979	-0.196	0.000
7	0.994	0.857	-0.510	0.000
8	0.995	0.839	-0.539	0.000
9	0.997	0.675	0.735	0.000
10	9.998	0.872	0.487	0.000
11	0.994	0.912	0.403	0.000
12	0.097	-0.264	-0.015	0.166
13	0.181	-0.264	-0.015	0.334
14	0.161	-0.264	-0.015	0.300
15	0.994	0.857	-0.510	0.000
16	0.328	-0.264	-0.015	0.508
Eigenvalues	10.488	7.055	2.367	1.067

TABLE Va

FACTOR PATTERN MATRIX, VARIMAX ROTATION,

FOR SCHOOL 3 ON COMMUNICATION

Test No. (Person)	Communalities			Factor		
	1			2		
1	0.965	0.922		0.333		0.057
2	0.322	-0.171		-0.156		-0.518
3	0.999	0.130		0.990		0.050
4	0.268	-0.174		-0.158		-0.461
5	0.200	-0.178		-0.162		-0.376
6	0.997	0.881		0.466		0.061
7	0.994	0.985		0.145		0.051
8	0.995	0.990		0.112		0.050
9	0.997	0.057		0.996		0.047
10	0.998	0.366		0.928		0.058
11	0.994	0.450		0.888		0.060
12	0.097	-0.202		-0.186		0.149
13	0.181	-0.209		-0.193		0.317
14	0.160	-0.208		-0.192		0.283
15	0.994	0.985		0.145		0.051
16	0.328	-0.217		-0.201		0.490
Eigenvalues	10.488	5.171		4.227		1.091

subgroup were P1, P6, P7, P8, P11, and P15. Those in the second subgroup because of sufficiently high loadings on the second factor were P3, P6, P9, P10, and P11. The only member with a sufficient loading on the third factor was P16, and since he was alone he does not constitute a subgroup.

Table Va shows that only P6 and P11 were members of both subgroups and this is substantiated by the sociogram shown in Figure 8 on page seventy-one. Both Table Va and the sociogram show the presence of two subgroups in this school. Upon inspection of the matrix in Figure 2 on page fifty-one it is found that P2, P4, P5, P12, P13, P14, and P16 had no reciprocated choices. These individuals on the first two factors in Table Va all have negative loadings, indicating that they are out of both of these communication networks.

The factor analysis results for School 3 on socialization indicated the presence of two subgroups, which result is also substantiated by the sociogram of Figure 9 on page seventy-one. The first subgroup is comprised of P2, P3, P9, P10, P11, P12, P13, and P16 while the second subgroup is comprised of P1, P6, P7, P8, and P15. No person was a member of more than one subgroup. It is evident from the sociogram that P13 connects the two subgroups, or is in an interstitial position, but his factor loading of 0.815 placed him in the first subgroup only. His loading on the

second factor was 0.317. It will be noted that the same members except for P11 make up the first subgroup in communication and the second subgroup in socialization. P11 is not found in the second socialization subgroup.

Summary of Chapter Four

This chapter has described in detail the matrix operations carried out for each of the six dimensions, and mentioned some of the problems involved and adjustments made. The rationale for each of the three different procedures used to operate on the matrices for six dimensions was given, and the method for determining influentials on each dimension indicated. The factor analysis approach to subgroup detection was described, and the result of its application to one of the schools in the sample was shown. The next chapter will describe the results of the tests of the first five hypotheses.

BIBLIOGRAPHY FOR CHAPTER IV

1. Beum, C. O. and G. Brundage. "A Method for Analyzing the Sociomatrix," Sociometry, XIII (1950), pp. 141-145.
2. Beum, C. O. and J. H. Criswell. "Applications of Machine Tabulation Methods to Sociometric Data," Sociometry, X (1947), pp. 227-232.
3. Blocker, C. E., R. H. McCabe, and A. J. Prendergast. A Method for the Sociometric Analysis of the Informal Organization Within Large Work Groups. Austin, Texas, 1964.
4. Blocker, C. E. and R. H. McCabe. Relationships Between The Informal Organization and the Curriculum in Six Junior Colleges. Austin, Texas, 1964.
5. Chabot, James. "A Simplified Example of the Use of Matrix Multiplication for the Analysis of Sociometric Data," Sociometry, XIII (1950), pp. 131-140.
6. Coleman, J. S. and D. MacCrae. "Electronic Processing of Sociometric Data for Groups up to 1,000 in Size," American Sociological Review, XXXIII (1960), pp. 722-727.
7. Cooper, Dan H. "The Potentialities of Sociometry for School Administration," Sociometry, X (1947), pp. 111-121.
8. Festinger, Leon. "The Analysis of Sociograms Using Matrix Algebra," Human Relations, II (1949), pp. 153-157.
9. Forsyth, Elaine and Leo Katz. "A Matrix Approach to the Analysis of Sociometric Data," Sociometry, IX (1946), pp. 340-347.
10. Fruchter, B. Introduction to Factor Analysis. Princeton, N. J.: D. Van Nostrand Co. Inc., 1954.
11. Harary, F. and I. C. Ross. "A Procedure for Clique Detection Using the Group Matrix," Sociometry, XX (1957), pp. 205-215.
12. House, J. H. "An Analysis of Interpersonal Influence Relation." Unpublished Ph. D. thesis, University of Alberta, 1966.

13. Katz, Leo. "Punched Card Techniques for the Analysis of Multiple Level Sociometric Data," Sociometry, XIII (1950), pp. 108-122.
14. MacCrae, Duncan. "Direct Factor Analysis of Sociometric Data," Sociometry, XXIII (1960), pp. 360-371.
15. McCleary, Lloyd E. "A Study of Interpersonal Influence Within A School Staff." Unpublished Ph. D. thesis, University of Illinois, 1957.
16. Moreno, J. L. Who Shall Survive? New York: Beacon House, 1934.
17. Weiss, Robert and Eugene Jacobson. "A Method for the Analysis of the Structure of Complex Organizations," American Sociological Review, XX (1955), pp. 661-668.

CHAPTER V

RESULTS OF THE STUDY CONCERNING INFLUENTIALS

This chapter presents the results of the tests of the first five hypotheses, all of which were concerned with influentials on the five task area dimensions of the study.

Test of Hypothesis One

The first hypothesis stated that there is a relationship between an individual being classified as an influential on any of the task area dimensions and his personal characteristics. Six sub-hypotheses were developed under this main hypothesis; these involved the variables of age, total experience, in-school experience, amount of teacher training, grade level taught, and sex.

Influentials for each dimension included the twenty per cent of the staff members in each school who received the highest weights on a given dimension. When two or more individuals at the lower end of the category were tied, these were excluded from the classification so that no more than twenty per cent of the total staff in any school were classified as influential on a given dimension. Influentials were determined on the basis of the cubed matrix which was derived from the original reciprocated matrix on

the communication and socialization dimensions, from the cubed matrix followed by a subweight substitution method for the three reliance dimensions, and from the original matrix of unreciprocated choices on the attributed influence dimension.

Once the influentials were defined for each school for a given dimension, they were treated as a group and compared with all other staff members, who were considered non-influential, for a given dimension. Differences between the two groups were tested by the t-test which tests the significance of the difference between means (1, pp. 161-169). The one-tailed t-test was considered appropriate as each of the sub-hypotheses involved direction (1, pp. 165-167). One of the assumptions underlying use of the t-test is equality of variance in the two distributions of the underlying variable; where this assumption is untenable the ordinary t-test should not be used. Welch's approximation to t should then be used instead (1, pp. 171-173).

The level of significance adopted for each of the sub-hypotheses was 0.05 or better. The t-value required for a one-tailed test at this level and 387 degrees of freedom is 1.645. The t-test could not be used for the sex variable, which is nominal; the chi square test was used for this variable, for which a value of 2.71 is required for a one-tailed test at the 0.05 level. The results of

the tests for the communication dimension are found in Table VI. In any of the t-tests carried out, where the F-ratio is significant indicating that the variances were not the same, Welch's t is also shown and was used as a significance test on that particular variable.

The results of the tests indicated that influentials on communication were in their present school longer, had more teacher training, taught at a higher grade level than non-influentials, and were more likely to be male than female. The difference in years of training was significant at the 0.01 level and the differences in the other two non-nominal variables were significant at the 0.05 level. Age and total experience differences were not significant, though the mean for the influential group as to total experience was somewhat higher. The value of chi square for the sex variable was 10.68, which was significant at the 0.001 level.

The results of the tests on the first reliance dimension, reliance as to discipline, are shown in Table VII. All of the differences except age were significant, and each of these were significant at the 0.01 level. Influentials were slightly older than non-influentials on this dimension but the result was not significant. As far as discipline is concerned, teachers tend to rely on those staff members who have more experience, both in the local

TABLE VI

RESULTS OF t-TESTS BETWEEN MEANS OF INFLUENTIALS
AND NON-INFLUENTIALS ON COMMUNICATION

Variable	Means		t	F	Welch's t
	Infl. N=77	Non-infl. N=312			
Age	37.90	38.18	0.155	1.222	
Total experience	13.44	11.61	1.472	1.149	
Present school exp.	5.71	4.10	<u>2.761*</u>	<u>2.100</u>	<u>2.23</u>
Years of training	3.01	2.33	<u>3.342</u>	1.044	
Grade level taught	6.95	5.92	<u>2.238**</u>	1.056	

*A double line under a value in the t-test result tables indicates significance at the 0.01 level.

**A single line under a value indicates significance at the 0.05 level.

TABLE VII

RESULTS OF t-TESTS BETWEEN MEANS OF INFLUENTIALS AND NON-INFLUENTIALS ON RELIANCE AS TO DISCIPLINE (REL. 1)

Variable	Means		t	F	Welch's t
	Infl. N=65	Non-infl. N=324			
Age	40.00	37.75	1.154	1.232	
Total experience	17.34	10.89	<u>4.978</u>	<u>1.378</u>	<u>4.49</u>
Present school exp.	6.32	4.03	<u>3.685</u>	<u>2.69</u>	<u>2.70</u>
Years of training	3.71	2.21	<u>7.195</u>	1.003	
Grade level taught	8.22	5.71	<u>5.275</u>	1.121	

_____ significant at 0.05 level

===== significant at 0.01 level

situation and on a total basis, have more teacher training, teach at a higher grade level, and are male.

Table VIII shows the results of the tests on the second reliance dimension, reliance as to teaching methods and materials. Every one of the differences was significant at the 0.01 level. When it comes to consulting other staff members in matters concerning teaching methods, materials, tests, or assignments, teachers rely on those who are male, older and more experienced, more highly trained, and who are teaching at higher grade levels than themselves.

The third reliance dimension was concerned with reliance as to the interpretation of school policies and regulations. The results of tests for this dimension are shown in Table IX. Again every difference was significant. The only difference between the second and third reliance dimensions was that the difference in age was significant at but the 0.05 level in the results in Table IX. With regard to the interpretation of school policies and regulations, teachers tend to rely on fellow staff members who are male, older, more experienced, more highly trained, and teaching at higher grade levels than themselves.

The results of tests for the attributed influence dimension are shown in Table X. Age was the only non-significant difference on this dimension, though influentials tended to be slightly older. Their mean age was 38.90

TABLE VIII

RESULTS OF t-TESTS BETWEEN MEANS OF INFLUENTIALS AND
NON-INFLUENTIALS ON RELIANCE AS TO TEACHING
METHODS AND MATERIALS (REL. 2)

Variable	Means		t	F	Welch's t
	Infl. N=71	Non-infl. N=318			
Age	41.76	37.37	<u>2.372</u>	<u>1.394</u>	<u>2.64</u>
Total experience	16.96	10.86	<u>4.873</u>	<u>1.520</u>	<u>4.28</u>
Present school exp.	6.48	3.96	<u>4.227</u>	<u>1.853</u>	<u>3.50</u>
Years of training	3.56	2.21	<u>6.840</u>	1.118	
Grade level taught	7.86	5.74	<u>4.578</u>	1.147	

_____ significant at 0.05 level

===== significant at 0.01 level

TABLE IX

RESULTS OF t-TESTS BETWEEN MEANS OF INFLUENTIALS AND
NON-INFLUENTIALS ON RELIANCE AS TO SCHOOL
POLICIES AND REGULATIONS (REL. 3)

Variable	Means		t	F	Welch's t
	Infl. N=67	Non-infl. N=322			
Age	40.81	37.57	<u>1.683</u>	<u>1.411</u>	<u>1.89</u>
Total experience	15.96	11.14	<u>3.713</u>	<u>1.476</u>	<u>3.28</u>
Present school exp.	6.15	4.06	<u>3.402</u>	<u>2.092</u>	<u>2.69</u>
Years of training	3.27	2.30	<u>4.563</u>	<u>1.346</u>	<u>4.15</u>
Grade level taught	7.24	5.89	<u>2.791</u>	<u>1.266</u>	<u>2.59</u>

 significant at 0.05 level

 significant at 0.01 level

TABLE X

RESULTS OF t-TESTS BETWEEN MEANS OF INFLUENTIALS AND NON-INFLUENTIALS ON THE ATTRIBUTED INFLUENCE DIMENSION

Variable	Infl. N=69	Non-infl. N=320	t	F	Welch's t
Age	38.90	37.96	0.493	<u>1.561</u>	0.57
Total experience	15.13	11.29	<u>2.979</u>	1.121	
Present school exp.	5.86	4.11	<u>2.863</u>	<u>2.010</u>	<u>2.30</u>
Years of training	3.67	2.21	<u>7.214</u>	1.212	
Grade level taught	8.00	5.72	<u>4.881</u>	1.018	

 significant at 0.05 level

 significant at 0.01 level

as compared to 37.96 for non-influentials. All the other differences in means were significant at the 0.01 level. Teachers attribute influence to more experienced, more highly trained teachers who are teaching at the higher grade levels and are males.

Summary of Results of Tests of Hypothesis One

The results of the t-test differences between means for influentials and non-influentials on the five task area dimensions for each variable are summarized in Table XI. From this table it is apparent that each of the differences was significant on the second and third reliance dimensions, and that age was the only non-significant difference on the attributed influence and first reliance dimensions. The differences for the variables of age and total teaching experience were not significant on the communication dimension.

A further examination of Table XI reveals that the years of training variable shows the most extreme differences between influentials and non-influentials, and that this variable is also the most consistent of the five variables studied, its difference being significant at either the 0.001 or 0.0001 level on each dimension. This would seem to indicate that teachers tend to recognize and to value expertness within their own group, more so than

TABLE XI

SUMMARY OF t-TEST RESULTS SHOWING SIGNIFICANCE
LEVELS ON FIVE TASK AREA DIMENSIONS

Dimension	Variable				
	Age	Total exp.	Present school exp.	Years of training	Grade level taught
Comm.	n.s.	n.s.	0.05	0.001	0.05
Rel. 1	n.s.	0.0001	0.01	0.0001	0.0001
Rel. 2	0.01	0.0001	0.001	0.0001	0.0001
Rel. 3	0.05	0.0001	0.001	0.001	0.0001
Att. Infl.	n.s.	0.01	0.05	0.0001	0.0001

n.s. - not significant

any of the other characteristics under study, and that this expertness is not restricted to a limited area as the differences for this variable were highly significant on each of the five dimensions.

Communication was the only dimension in which there was more than one non-significant difference, and these were age and total teaching experience. A possible explanation for this is that perhaps teachers do not consider the communication dimension as much a part of the formal work structure as the other four dimensions; it may be regarded as more informal by them.

The chi square results for the tests of Hypothesis 1.6 are summarized in Table XII below. The results showed males to be more influential than female staff members, and in each case the results were significant at the 0.001 level or beyond.

TABLE XII
SUMMARY OF CHI SQUARE RESULTS FOR MALE-FEMALE
DIFFERENCES ON FIVE TASK AREA DIMENSIONS

Dimension	Chi square
Communication	10.683
Reliance 1	49.213
Reliance 2	27.164
Reliance 3	28.488
Attributed influence	41.379

The tests of the data for Hypothesis 1 lead to the following conclusions:

Hypothesis 1.1 which stated that influentials will be older than non-influentials was accepted for the second and third reliance dimensions, but rejected for the communication, attributed influence, and first reliance dimensions.

Hypothesis 1.2 which stated that influentials would have more years of total teaching experience than non-influentials was accepted for each of the reliance dimensions and the attributed influence dimension, but rejected for the communication dimension.

Hypothesis 1.3 which stated that influentials would have longer teaching experience in their school than non-influentials was accepted for each of the five dimensions.

Hypothesis 1.4 which stated that influentials would have more years of teacher education than non-influentials was substantiated in each case and therefore accepted on each of the five dimensions.

Hypothesis 1.5 which stated that influentials would be teaching at higher grade levels than non-influentials was accepted for each of the five dimensions.

Hypothesis 1.6 which stated that influentials would tend to be male was accepted on all five dimensions.

A Pearson product moment correlation of five of the variables studied in the first hypothesis revealed a number of significant relationships. These correlations are shown in Table XIII. There was a significant positive correlation

between age and both of the experience variables, and a significant negative correlation between age and amount of training. There was also a significant positive correlation between total teaching experience and experience in the present school, and between years of teacher education and grade level taught. Thus a number of the variables were interrelated to some extent.

TABLE XIII
PEARSON PRODUCT MOMENT CORRELATIONS FOR
A NUMBER OF VARIABLES
N = 389

Variable	(1)	(2)	(3)	(4)	(5)
(1) Age	1.00	+0.803*	+0.491*	-0.123*	-0.100
(2) Total teaching experience		1.000	+0.579*	-0.014	-0.068
(3) Present school experience			1.000	-0.015	-0.008
(4) Years of teacher education				1.000	+0.561*
(5) Grade level taught					1.000

*significant at the 0.05 level

Test of Hypothesis One on an Individual School Basis

The results discussed up to this point considered differences between influentials and non-influentials on an across all schools basis. Differences between influentials

and non-influentials within each school were tested as well and a summary of the results is found in Table XIV. As can be seen from the table, the results were significant in only a few schools on any dimension for most variables. This was mainly due to the extremely small size of each group in each school. The only variable in which significant results were found in over half the schools on any dimension was years of training, and this was the case on three of the dimensions. As in the tests between means for influentials and non-influentials across all schools, the differences for this variable on a within schools basis proved to be more significant than were those for any other variable. Similarly the variable age showed fewer significant differences than any other variable in both methods of testing.

As an example of the few significant differences that exist within schools, the results for School 8 on the first reliance dimension are shown in Table XV. The only significant difference in this school was grade level taught.

Test of Hypothesis Two

Hypothesis 2 consisted of two parts which predicted that influentials on each of the five task areas would consider their school to be more effective in educating its students and would be more satisfied with all aspects of their teaching or working situation than non-influentials.

TABLE XIV

SUMMARY OF t-TEST COMPARISONS OF MEANS BETWEEN INFLUENTIALS
AND NON-INFLUENTIALS WITHIN EACH SCHOOL ON
FIVE TASK AREA DIMENSIONS N=18

Dimension	Number of schools in which given result was significant at 0.05 level				
	Age	Total exp.	Present school exp.	Years of training	Grade level taught
Comm.	4	4	4	6	8
Rel. 1	3	6	4	13	6
Rel. 2	5	6	5	11	7
Rel. 3	7	5	5	6	2
Att. Infl.	3	3	4	12	7

TABLE XV

t-TESTS BETWEEN MEANS OF INFLUENTIALS AND NON-INFLUENTIALS
ON RELIANCE AS TO DISCIPLINE (REL. 1) FOR SCHOOL 8

Variable	Means		t	F	Welch's t
	Infl. N=6	Non-infl. N=23			
Age	42.00	44.22	0.303	<u>2.247</u>	0.39
Total experience	16.17	17.48	0.250	1.244	
Present school exp.	5.00	4.91	0.044	1.251	
Years of training	3.00	1.91	1.649	<u>2.140</u>	1.38
Grade level taught	8.50	4.09	<u>4.040</u>	<u>11.167</u>	<u>7.15</u>

_____ significant at 0.05 level

===== significant at 0.01 level

The chi square test of significance was considered appropriate in testing Hypothesis 2 (1, pp. 191-208). The value of chi square required at the 0.05 level of significance and one degree of freedom is 3.84. An example of one of the chi square tests is given in Table XVI. The example is for the test between the frequency of influentials and non-influentials on the question of satisfaction with all aspects of the teaching situation, and is given for the communication dimension. The chi square value for the given frequency distribution is 0.020, which is not significant.

TABLE XVI
FREQUENCY TABLE FOR CHI SQUARE TEST FOR SATISFACTION
WITH TEACHING ON COMMUNICATION DIMENSION

	Frequency		Total
	More satisfied	Less satisfied	
Influentials	62	15	77
Non-influentials	251	58	309
Total	313	73	386

Chi square = 0.020

The results of the chi square tests for the two questions on five dimensions tested for this hypothesis are summarized in Table XVII. An examination of this table reveals that the differences for either variable are not significant

TABLE XVII

SUMMARY OF CHI SQUARE TESTS FOR TESTS OF HYPOTHESIS TWO

Variable	Chi Square	
	Question of school effectiveness	Question of satisfaction with teaching
Comm.	0.038	0.020
Rel. 1	0.435	0.202
Rel. 2	0.809	0.037
Rel. 3	0.025	0.208
Att. Infl.	2.117	2.821

on any dimension. The only dimension which anywhere nearly approaches significance is the attributed influence dimension. In summary, tests of Hypothesis 2 revealed the following:

Hypothesis 2.1 which stated that influentials would consider their school to be more effective in educating its students than non-influentials was not verified on any of the five dimensions, and was thus rejected.

Hypothesis 2.2 which stated that influentials would be more satisfied with their teaching or working situation than non-influentials was rejected on each of the five dimensions as no significant results were found.

Test of Hypothesis Two on an Individual School Basis

Relationships comparing influentials to non-influentials on a within schools basis were also tested. The Kolmogorov-Smirnov two-sample test of whether two independent samples were drawn from populations of the same distributions was used to test these relationships (2, pp. 127-136). No schools showed significant results on the school effectiveness question. Only one school showed significant results on the satisfaction with teaching question on each dimension except communication, for which there were no significant results. Thus very few significant results were found on a within schools basis in testing Hypothesis 2; this again was mainly due to the small size of each group.

Test of Hypothesis Three

Hypothesis 3 stated that individuals in administrative positions in the school such as those of principal or vice-principal would be influential in each of the five task area dimensions. The matrices from which influentials were determined were examined for each school to see if principals and vice-principals were considered influential for a given dimension. If they were influential their rank in the group was determined and their rank entered in Table XVIII. After the ranks for each dimension in each school had been determined for principals and vice-principals, a mean rank for all those included in the category was calculated.

Upon examination of Table XVIII it is evident that fourteen of eighteen or 76.8 per cent of all principals were influential on communication, and of these ten ranked first, three ranked second, and one ranked fifth. Their mean rank was 1.50. Ten of twenty-three vice-principals or 43.5 per cent of the sample were influential. The mean rank of 1.70 for vice-principals is only slightly lower than that of 1.50 for principals (it should be noted here that the lower the number, the higher the rank). In other words vice-principals are almost as important as principals in the communication network in this sample. This might possibly be attributed to a practice which is quite common in schools, namely that of principals delegating to their vice-principals

TABLE XVIII

RANKING OF SCHOOL ADMINISTRATORS AS INFLUENTIALS

School Number	Rank of individual as influential in his school for given dimension									
	Comm.		Rel. 1		Rel. 2		Rel. 3		Att. Infl.	
	Prin.	V.P.	Prin.	V.P.	Prin.	V.P.	Prin.	V.P.	Prin.	V.P.
1*	-	-	1	3	2	3	1	4	1	3
2	-	-	1	-	1	-	1	-	1	-
3	2	1	1	2	1	-	1	2	1	2
4	1	2	1	2	2	1	1	2	1	2
5	1	-	1	2	1	3	1	2	1	-
6*	1	-	1	2	2	4	2	3	1	-
7	1	3	1	2	1	2	1	2	2	1
8	1	-	1	2	1	2	1	2	1	2
9	2	1	1	2	1	2	1	2	1	2
10	1	3	1	2	2	1	1	2	2	1
11*	-	-	1	3	1	2	1	3	1	4
12*	-	-	1	2	1	3	1	2	1	2
13*	1	-	1	3	1	3	1	3	1	3
14	5	-	1	2	1	2	1	2	1	2
15	1	2	1	3	1	2	1	2	1	-
16	1	2	1	-	1	-	1	2	1	4
17	2	-	1	2	1	2	1	2	1	2
18	1	-	1	3	1	-	1	2	1	3
Mean Rank	1.50	1.70	1.00	2.43	1.22	2.17	1.06	2.23	1.11	2.35

*School has more than one vice-principal.

responsibility for directives, allocation of text-books and supplies and so forth.

Every principal was influential on reliance as to discipline, and in every school he ranked first. Twenty-one of twenty-three vice-principals or 91.4 per cent were influential and attained a mean rank of 2.43. Actually the mean rank of all vice-principals is probably somewhat closer to 2.00, as five of the schools had two vice-principals and if one of them ranked second the other could rank no better than third. It is rather significant that the mean rank for principals was higher on the reliance dimension concerning discipline than it was for any other dimension. This may indicate that principals are still regarded as disciplinarians or source of authority to discipline by many of their staff members.

All principals were influential on reliance concerning teaching methods and materials, tests, and assignments with fourteen principals ranking first and four principals ranking second. Their mean rank was 1.22. Eighteen of twenty-three vice-principals or 78.4 per cent of the total were influential; their mean rank was 2.17. It is interesting to note that where the principal ranked second on this dimension, one of his vice-principals ranked first.

Each principal was influential on the reliance dimension concerning interpretation of school policies and

regulations, with all but one principal ranking first. Their mean rank was 1.06. All but one of the vice-principals were influential and the mean rank attained was 2.23.

All principals were influential on the attributed influence dimension with all but two of them ranking first so as to obtain a mean rank of 1.11. Seventeen vice-principals or 74.0 per cent of the total possible were influential, with two ranking first, nine ranking second, four ranking third, and two ranking fourth. The mean rank was 2.35.

In summarizing the above results on the three reliance dimensions and the attributed influence dimension, it is observed that every principal was influential on each of these dimensions, with fourteen or more of the principals ranking first on each of the dimensions in their schools. Seventeen or more of the vice-principals, or above 74 per cent of the total possible were influential on each of these dimensions in their school. The mean ranks for principals on each of these dimensions was close to 1.00 and for vice-principals was just over 2.00, indicating that on an overall basis for the schools in the sample teachers regarded the principal as the most influential staff member and the vice-principal as the second most influential staff member in their school. The communication dimension was not nearly so clear however, as already mentioned. Not all of the principals were influential and less than half the

vice-principals were influential in communication, with means for the two groups quite close to each other.

The data can be examined in another way as shown in Table XIX. This table shows the number of dimensions of the total possible five on which each principal and vice-principal in the sample were influential. Fourteen of eighteen principals were influential on all five dimensions; the mean number of dimensions on which all principals were influential was 4.77. The mean number of dimensions on which vice-principals were influential was 3.83.

In summary, essentially all principals were influential on each of the five task area dimensions and vice-principals were influential on an average of nearly four dimensions. The hypothesis that administrators would be influential on each of the five task area dimensions was thus accepted.

Test of Hypothesis Four

Hypothesis four stated that principals would be generalized influentials, where a generalized influential was defined as an individual who was influential on four or more of the task area dimensions. An examination of the matrices from which influentials were determined revealed that there were forty generalized influentials in the total sample. Included in this classification were all eighteen

TABLE XIX

FREQUENCY TABLE OF NUMBER OF TASK AREA DIMENSIONS
IN WHICH ADMINISTRATORS ARE INFLUENTIAL

School Number	Principal	Vice-principal
1*	4	4
2	4	5
3	5	0
4	5	4
5	5	5
6*	5	3
7	5	3
8	5	5
9	5	4
10	5	5
11*	4	4
12*	4	4
13*	5	5
14	5	3
15	5	4
16	5	4
17	5	3
18	5	4
Mean for group	4.77	3.83
Number influential on:		
5 dimensions	14	6
4 dimensions	4	10
3 dimensions	-	6
0 dimensions	-	1

*School has more than one vice-principal.

principals, sixteen of twenty-three vice-principals, five classroom teachers, and one reading coordinator. Since all principals were classified as generalized influentials, the hypothesis was accepted. A re-examination of Table XIX reveals that if generalized influentials had been defined on the basis of those influential on all five dimensions, fourteen of eighteen principals and six of the vice-principals would still have been generalized influentials.

It is of interest to study the classroom teachers who were classified as generalized influentials more closely. There was little similarity of characteristics in this particular group of five when the group was viewed as a whole. They tended to the extremities of the teaching force on the variables of age, sex, years of training, grade level taught, and length of experience in their present school.

In summary, since all principals were found to be generalized influentials, the hypothesis was accepted.

Test of Hypothesis Five

This hypothesis stated that basically the same individuals would be influential on the communication dimension, the three reliance dimensions, and the attributed influence dimension in each school.

The data required to test this hypothesis did not lend themselves to treatment by any statistical test, and

the results were thus tabulated and then examined. Data for the test of this hypothesis are found in Table XX. This table lists the number of staff members in each school and the maximum possible number of influentials on any dimension according to the definition. The number of individuals who were influential on three or more, or over half of the dimensions, was recorded for each school and the percentage that these influentials accounted for of the total possible number of influentials in each school was calculated. The maximum allowable number of influentials on any dimension was seventy-nine, or 20.3 per cent of the total sample of 389 staff members. Of this maximum possible number of seventy-nine, fifty-six or 73.4 per cent were influential on three or more task area dimensions. An examination of the last column of Table XX shows that the percentage of influentials who were influential on three or more dimensions was 66.7 per cent or greater in fourteen of the schools, and in three of these schools it was 100 per cent. Only in one school, School 8, did this percentage fall below 50.0 per cent. Thus if an individual was classified as an influential on one of the five task areas of the school, chances were about three in four that he would be influential on three or more of the dimensions. On these grounds the hypothesis that basically the same individuals would be influential on the task area dimensions was accepted.

TABLE XX

FREQUENCY OF INDIVIDUALS WHO WERE INFLUENTIAL ON THREE OR
MORE TASK AREA DIMENSIONS IN EACH SCHOOL

School No.	No. of Staff Members	Maximum pos- sible no. of influentials on any dimen- sion	No. of indi- viduals influential on three or more dimen- sions	Percent of influentials influential on three or more dimensions
1	29	6	3	50.0
2	19	4	3	75.0
3	16	3	2	66.7
4	20	4	3	75.0
5	14	3	3	100.0
6	33	7	6	85.7
7	20	4	2	50.0
8	29	6	2	33.3
9	15	3	2	66.7
10	17	3	2	66.7
11	25	5	4	80.0
12	19	4	4	100.0
13	28	6	5	83.3
14	30	6	3	50.0
15	30	3	2	66.7
16	30	6	5	83.3
17	15	3	3	100.0
18	14	3	2	66.7
Totals	389	79	56	---

Tests of Other Relationships

Two other comparisons were made across all schools and tested in the manner of the first two hypotheses on the same variables. The comparisons made were between means of generalized influentials and of all other individuals in the sample, and between means for those in administrative positions and those in all other positions. The t-test differences between means of generalized influentials and non-influentials on five variables are presented in Table XXI. All of the results were highly significant. Generalized influentials are older, more experienced, more highly trained, and teach at higher grade levels than other teachers in the sample. These results are not very surprising in view of the fact that most of these variables showed significant results on nearly all of the dimensions in the tests of the first hypothesis, and the generalized influentials are those individuals who are influential on four or more of the dimensions.

The t-test differences between means of administrators and non-administrators are shown in Table XXII. Again all results are significant. Administrators compared to other staff members are older, have more experience both in the local school and elsewhere, are more highly trained and teach at a higher grade level. The results in Tables XXI and XXII might be further compared. There is very little

TABLE XXI

RESULTS OF t-TESTS BETWEEN MEANS OF GENERALIZED
INFLUENTIALS AND ALL OTHER INDIVIDUALS

Variable	\bar{X}_1 N=40	\bar{X}_2 N=349	t	F	Welch's t	Level of sig- nificance of t
Age	42.25	37.65	1.924	1.875	2.47	0.01
Total experience	17.92	11.29	4.135	1.184	-	0.00005
Present school exp.	7.35	4.08	4.312	2.692	2.95	0.005
Years of training	3.97	2.30	6.543	1.249	-	0.000001
Grade level taught	8.45	5.86	4.389	1.181	-	0.00001

TABLE XXII

RESULTS OF t-TESTS BETWEEN MEANS OF ADMINISTRATORS
AND NON-ADMINISTRATORS

Variable	\bar{X}_1 N=41	\bar{X}_2 N=348	t	F	Welch's t	Level of sig- nificance of t
Age	42.20	37.64	1.924	1.608	2.32	0.05
Total experience	19.32	11.10	5.238	1.149	---	0.000001
Present school exp.	7.39	4.07	4.438	2.910	2.96	0.005
Years of training	4.39	2.24	8.794	1.889	11.30	0.000001
Grade level taught	8.78	5.81	5.126	1.301	---	0.000001

difference in the people included in the two tables, and this is reflected in the means and t-values in the two tables, especially for the variables of age and present school experience. These small differences between the two tables are due to the fact that thirty-four of the forty people included in the first group in Table XXI are also included in the first group in Table XXII, as all eighteen principals and sixteen of the vice-principals were generalized influentials (see Table XIX).

The chi square tests as to whether generalized influentials considered their school more effective yielded no significant results; results on the satisfaction with teaching question were not significant either. The tests between administrators and non-administrators on the school effectiveness variable and on the satisfaction with teaching variable yielded non-significant results as well. This means to say that neither generalized influentials nor administrators consider their school more effective in teaching its students than do any other staff members, nor are they more satisfied with their jobs than any other staff members.

Summary of Chapter Five

In this chapter the results of the tests of the first five hypotheses were described. The tests of Hypothesis 1

indicated that on nearly all dimensions influentials were older, had more total and present school experience, were more highly trained, taught at higher grade levels than non-influentials, and were of the male sex. The chi square results in testing Hypothesis 2 revealed that influentials neither regarded their school to be more effective in educating its students nor were they more satisfied with their teaching situation. The hypothesis was thus rejected.

In testing Hypothesis 3 which stated that individuals in administrative positions would be influential on each of the five task area dimensions it was found that principals and vice-principals were influential on an average of 4.77 and 3.83 dimensions respectively out of a maximum possible number of five dimensions. The hypothesis was therefore accepted. Hypothesis 4 which stated that principals would be generalized influentials was accepted as every principal was a generalized influential. Hypothesis 5 which stated that basically the same individuals would be influential on the five task area dimensions was accepted as fifty-six, or 73.4 per cent of the maximum possible number of influentials in the sample were influential on three or more dimensions.

Chapter six will discuss the results of the tests of the remaining two hypotheses, which related to subgroups and their characteristics.

BIBLIOGRAPHY FOR CHAPTER V

1. Ferguson, George A. Statistical Analysis in Psychology and Education, Second Edition. New York: McGraw-Hill Book Co., 1966.
2. Siegel, Sidney. Nonparametric Statistics for the Behavioural Sciences. New York: McGraw-Hill Book Co., 1956.

CHAPTER VI

RESULTS OF THE STUDY CONCERNING SUBGROUPS

This chapter describes the results of the tests of the remaining two hypotheses, both of which dealt with subgroups and their structure. The first of these two hypotheses, Hypothesis 6, stated that the subgroups in the communication and socialization dimensions would be comprised of different people. In order to determine whether or not this was the case required first of all the determination of subgroup membership. Once subgroup membership was determined it was possible to examine similarities of characteristics of members within subgroups, which was the test of the seventh hypothesis which stated that the members of a given subgroup would be similar as to age, years of training, grade level taught, sex, and both total teaching experience and local school experience.

Subgroups for this study were determined only for the communication and socialization dimensions, in which the reciprocated choice matrix was used. A subgroup for purposes of this study was operationally defined as a group of three or more members who interacted with each other.

Some Findings in the Study of Group Structure

A description of types of group structure existent in schools will be given before the results of the tests of

the last two hypotheses are described. Upon testing the sixth hypothesis it was observed that there was considerable variation in size of subgroups from school to school and within schools. The sociograms also indicated varying types of school group structure. Upon closer examination of the sociograms, which were drawn from the original reciprocated matrix though the subgroup structure was determined from factor analysis, five general types of school group structure were developed. These were structures (1) of one subgroup only, (2) of the wheel-type with one important person at the center, (3) of two or more subgroups with at least one of the subgroups isolated from all others, (4) of two or more subgroups connected to each other through only one or two persons, and (5) of two or more subgroups with considerable overlap of membership. The group structure of each school in communication and socialization is categorized by type in Table XXIII. Some of the structures could be classified as to two types, and these are indicated in the table. It will be noted that the fourth and fifth type of structures were most common, or generally, schools have two or more subgroups with at least some interconnections between them.

Two schools in communication and one in socialization had but one subgroup only. There were no wheel-type structures in socialization, but six of the schools or one-third of the sample had this type of structure in communication.

TABLE XXIII

SCHOOL SUBGROUPS CLASSIFIED BY TYPES

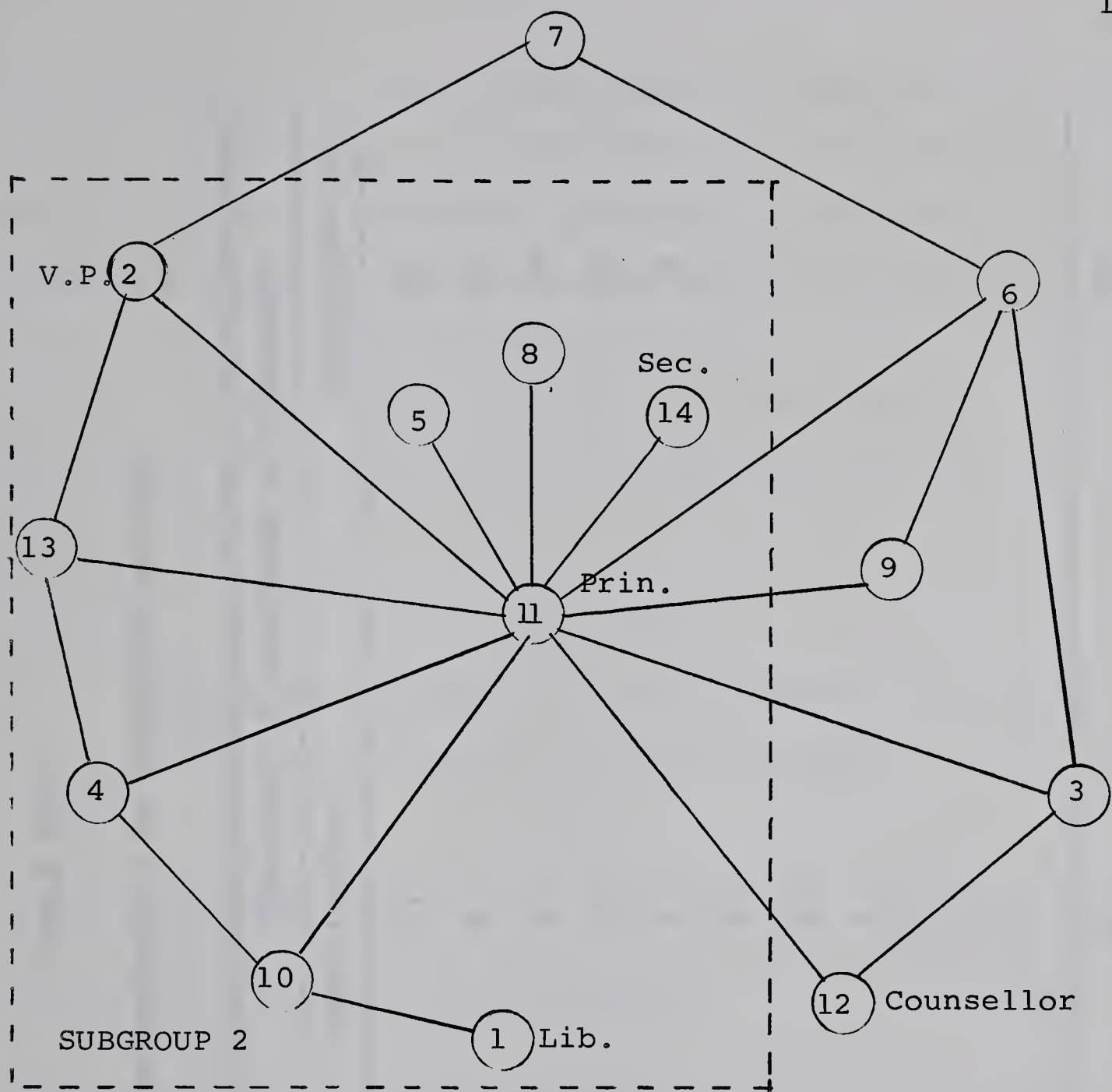
Type	School identification number in which subgroups are found on	
	Communication	Socialization
1. One subgroup only	4,15*	18
2. Wheel	5*,7,8,13*,15,18*	-
3. Two or more subgroups with at least one of the subgroups isolated from all others	1*,6*,11*	1*,5*,6,8,17*
4. Two or more subgroups con- nected to each other through only one or two persons (i.e. little overlap)	1*,2,3,9,11*,13*,14	1*,2,3,10,11,14,15, 16,17*
5. Two or more subgroups with considerable overlap of membership	5*,6*,10,12,16,17,18*	4,5*,7,9,12,13

*These schools were considered as having subgroups which could be classified into two different types.

In every one of the six cases, the principal was at the hub of the "wheel". This type of structure is illustrated in Figure 12, which shows the communication sociogram for School 18. Structures of the fourth type have a tendency to repeat themselves in the other dimension. Five of the schools in this classification have the same type of structure in communication and socialization. The types of group structure will be discussed in more detail later.

The relationship of number of subgroups and size of subgroups to school size was investigated. Table XXIV on page 121 gives the frequency of the various sizes of subgroups in the two dimensions. Over one-half of the subgroups in the sample in either dimension had six or fewer members. Also communication subgroups tended to be slightly larger than socialization subgroups across the sample, the mean subgroup sizes being 7.90 and 6.97 members respectively.

A number of Spearman rho rank correlation coefficients were calculated to determine relationships between sizes and number of subgroups to school size. These relationships are summarized in Table XXV on page 122. It was found that there was a significant positive relationship between school size and the number of subgroups found in schools in both the communication and socialization dimensions. There was however no significant relationship between size of subgroup and size of staff in either dimension.



Subgroup 1 consists of everybody in the sociogram except P1, the librarian.

FIGURE 12
SOCIOGRAM FOR SCHOOL 18,
COMMUNICATION

TABLE XXIV

FREQUENCY DISTRIBUTION OF SUBGROUPS BY SIZE

No. of members in subgroups	Frequency of subgroups in dimension	
	Communication	Socialization
3 - 4	13	15
5 - 6	14	17
7 - 8	8	9
9 - 10	2	9
11 - 12	5	4
13 - 14	2	-
15 - 16	4	1
17 - 18	1	1
19 - 20	1	1
21 or more	1	-
Totals	51	57

Thus the size of a school staff gave no indication of the size of its subgroups, as the measure of association was not significant. Spearman's rho was also calculated for the number of communication and socialization subgroups in each school. The resulting Spearman rho value was 0.531, significant at the 0.05 level. In other words the number of communication and socialization subgroups in a given school is about the same.

TABLE XXV
SUMMARY OF SPEARMAN RHO TESTS BETWEEN STAFF SIZE
AND A NUMBER OF GROUP VARIABLES

N = 18

Group variable	Spearman rho
Frequency of communication subgroups found in schools by ranks	0.531*
Frequency of socialization subgroups found in schools by ranks	0.558*
Mean size of communication subgroups in schools by ranks	0.080
Mean size of socialization subgroups in schools by ranks	0.250

*significant at 0.05 level

All but one principal and one vice-principal in the schools of the sample were in the communication network in their school. Three principals and four vice-principals

remained outside their school's socialization network. The fact that such a large proportion of the administrative staff were in the socialization network may be another indication that the school communication and socialization networks are not that different from each other.

Description of Types of Group Structures

As was mentioned earlier, five types of group structure were developed, for which at least one sociogram depicting each of these types is included in the thesis.

Figure 13 illustrates a Type 1 structure consisting of one subgroup only. This structure is found in communication in School 4, a junior high school with twenty staff members. The only subgroup is enclosed in the dashed lines, and consists of eleven members. Six members are isolates, having no connections with the group or with each other. P1 and P6 make a mutual pair. The sociogram might lead one to conclude that P9 should be a member of the group, but his factor loading was only 0.181. The reason for his low factor loading is that he has only an indirect link to P10 through P12. P7 and P18 are in the group because of a direct connection with P10, who has the largest number of reciprocated choices in the group and is most important. For the same reason P15 and P16 are members of the group because of direct connections with people important in the

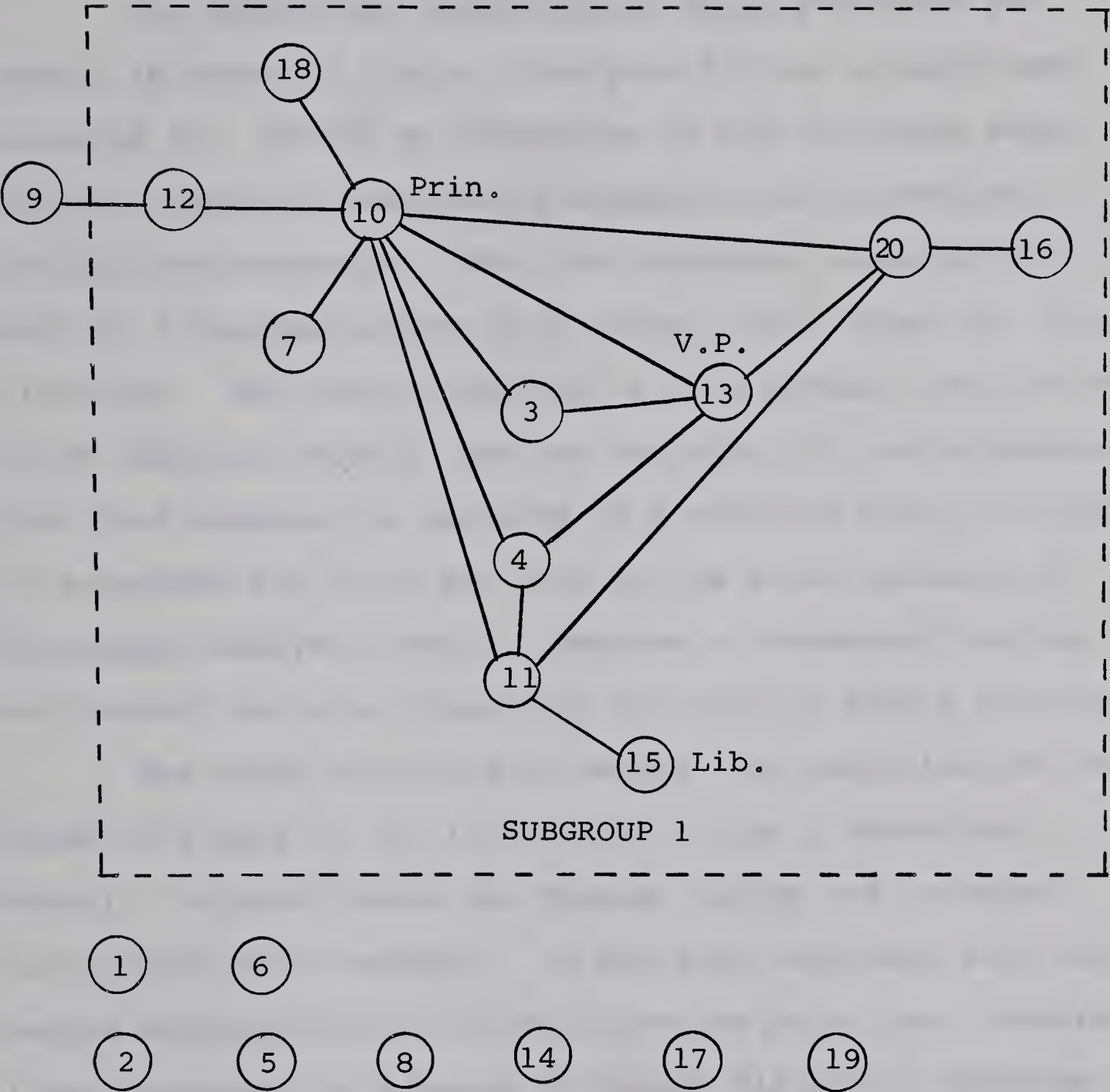


FIGURE 13
SOCIOGRAM FOR SCHOOL 4,
COMMUNICATION

structure, namely P11 and P20.

The wheel-type communication group structure for School 18 shown in Figure 12 on page 120 has already been referred to. Though an inspection of the sociogram makes only one subgroup immediately apparent, factor analysis reveals two subgroups. The first subgroup includes everybody in a fourteen-member high school staff except P1, the librarian. The second subgroup of nine members overlaps the first subgroup greatly, and now includes P1. An indication that this subgroup is somewhat of a separate entity is that it accounted for 14.24 per cent of the total variance in the factor analysis result. Because of extensive overlap, this school was also classified as having a Type 5 structure.

The group structure of School 1 in socialization is shown in Figure 14 and illustrates a Type 3 structure. School 1 offered grades one through twelve and included twenty-nine staff members. It had four subgroups with the second subgroup being isolated from the main flow. Subgroup 1 was connected to Subgroup 3 through P14 and to Subgroup 4 through P22, who was the only staff member in more than one subgroup in the entire school. Because of few connections between groups, this was also classified as a Type 4 structure. Three members were isolates, one of whom was the principal; P6 and P25 were a mutual pair. It might be noted that the first subgroup appears quite cohesive as it has

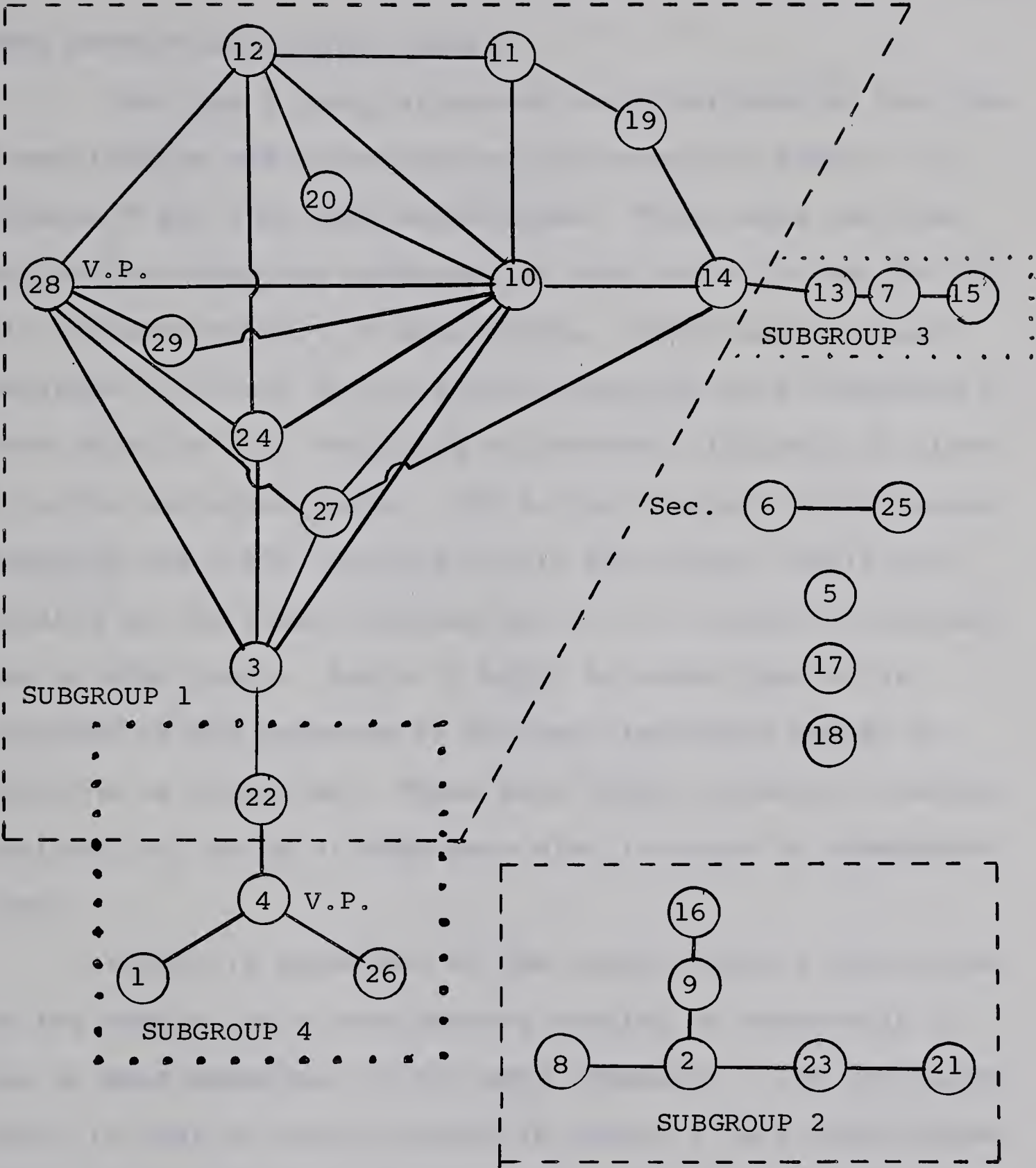


FIGURE 14
SOCIOGRAM FOR SCHOOL 1,
SOCIALIZATION

many connections within itself.

The Type 4 group structure is illustrated by both the communication and socialization sociograms of School 3 in Figures 8 and 9 on page seventy-one. There were two communication subgroups connected to each other through P6 and P11 who were members of both groups. Seven members were isolates. The two socialization subgroups were connected to each other by P13, who would be somewhat difficult to place from the sociogram alone. His factor loading on the second subgroup was 0.815, placing him in this group, while his loading on the first subgroup was 0.317, too low to include him in that group. Again it might be noted that he is included in the subgroup of the more important member to which he is connected. There were three isolates in socialization, all three of whom were also isolates in communication.

Figure 15 shows one of the simpler Type 5 structures in the sample, with considerable overlap of membership in two or more subgroups of the same dimension. The sociogram shown is that of socialization in School 9, a fifteen member junior high school. There were two isolates, one of whom was the principal; P3 and P8 formed a mutual pair. P1, P5, P6, P11, and P14 were members who were found in both subgroups. Again though only one subgroup is apparent from the sociogram, the first subgroup accounted for 65.91 per cent

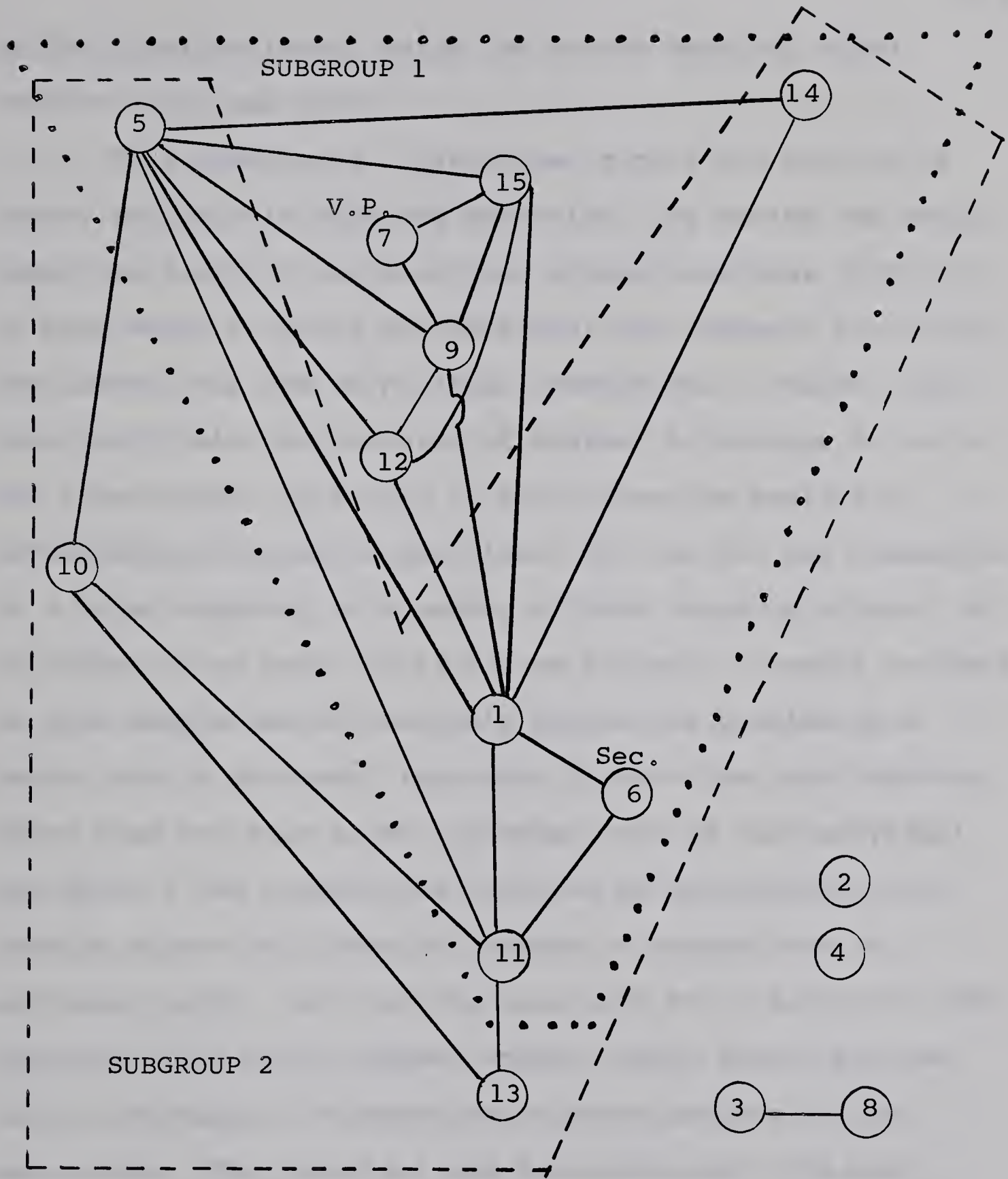


FIGURE 15

SOCIOGRAM FOR SCHOOL 9,

SOCIALIZATION

of the total variance, while the second subgroup added another 12.61 per cent.

This discussion illustrates in part the utility of factor analysis in subgroup detection. By having the sociograms available it was seen that it was sometimes difficult to know where to place an individual who connects two groups, who himself has few or no other connections. Factor loadings facilitate the decision of whether he belongs in one or the other group, or both. It also gives the basis for establishing whether an individual who has but one connection to a major subgroup is a member of that subgroup or not. P1 in Figure 12 on page 120 is a case in point. Factor analysis in this sample has not entirely solved the problem of a person who is obviously important in more than one subgroup. There does not seem to be a problem even if the individual had quite a few connections with two or more groups; the problem arises only when the number of connections is extremely high. Such was the case with P7 in School 16, the principal of a thirty member school, which school had two large subgroups of eighteen and sixteen members in communication. The principal was quite obviously the most important person in either subgroup but his loadings were only 0.360 and 0.200. This result is a function of the consideration of all relationships in factor analysis. Blocker mentions the same problem (1, p.106), which needs further study.

Test of Hypothesis Six

Once subgroups had been identified the sixth hypothesis could be tested. This hypothesis stated that different members would be found in the communication subgroups from those in the socialization subgroups. The basis for this hypothesis was that the communication dimension was assumed to be a part of the task area structure of the school whereas the socialization dimension was considered to be part of the informal structure in which the individual could find emotional expression.

Table XXVI lists all the communication and socialization subgroups in each school, the number of members in each subgroup, the members common to both types of subgroups, and the percentage of members in a subgroup on one dimension which is common to a corresponding subgroup on the other dimension. For example, the first entry in the table indicates that the first subgroup in School 1 had eight members in communication, twelve members in socialization, and seven of the members were common to both subgroups. Thus seven of eight or 87.5 per cent of the communication subgroup members were common to both of the number one subgroups, and seven of twelve or 58.3 per cent of the socialization subgroup members were common to both of the number one subgroups. Subgroup 3 was a communication subgroup only and therefore had no socialization counterpart or members in common with it.

TABLE XXVI

COMMONALITY OF MEMBERS IN COMMUNICATION AND
SOCIALIZATION NETWORKS OF SCHOOLS

School No.	Staff size	Sub-group no.	Members in comm. subgroup	Members in soc. subgroup	Members common to both subgroups	a	b
1	29	1	8	12	7	87.5	58.3
		2	8	6	4	50.0	66.7
		3	3	-	-	-	-
		4	-	3	2 (G2C) *	25.0	66.7
		5	-	4	1 (G3C)	33.0	25.0
2	19	1	6	7	5	83.3	71.4
		2	6	5	4	66.7	80.0
		3	5	3	1	20.0	33.3
		4	-	4	-	-	-
3	16	1	6	5	5	83.3	100.0
		2	5	8	4	80.0	50.0
4	20	1	11	10	5	45.5	50.0
		2	-	7	5 (G1C)	45.5	71.4
5	14	1	12	6	5	41.7	83.3
		2	6	7	4	66.7	57.2
		3	-	5	5 (G1C)	41.7	100.0
6	33	1	12	16	11	91.7	68.8
		2	5	3	3	60.0	100.0
		3	3	4	2	66.7	50.0
		4	7	-	5 (G1S)	31.3	71.4
		5	3	-	-	-	-
		6	3	-	-	-	-
7	20	1	15	12	11	73.4	91.7
		2	4	6	1	25.0	16.7
8	29	1	20	8	8	40.0	100.0
		2	10	9	7	70.0	77.8
		3	5	10	5	100.0	50.0
		4	-	3	3 (G1C)	15.0	100.0
9	15	1	5	9	4	80.0	44.4
		2	6	7	5	83.3	71.4
		3	5	-	3 (G2S)	60.0	33.3

^a Percent of members in communication subgroup which are common to both communication and socialization subgroups

^b Percent of members in socialization subgroup which are common to both communication and socialization subgroups

* (G2C) Number of members which are common to the second subgroup in communication, etc.

TABLE XXVI (Continued)

School No.	Staff size	Sub-group no.	Members in comm. subgroup	Members in soc. subgroup	Members common to both subgroups	a	b
10	17	1	13	6	6	46.1	100.0
		2	11	9	8	72.7	88.9
		3	-	3	3 (G1C)	23.1	100.0
		4	-	4	3 (G2C) *	27.3	75.0
11	25	1	7	5	4	57.2	80.0
		2	4	6	4	100.0	66.7
		3	4	5	3	75.0	60.0
		4	3	4	3	100.0	75.0
		5	3	7	2	66.7	28.6
12	19	1	11	10	9	81.7	90.0
		2	5	-	-	-	-
		3	-	5	4 (G1C)	36.3	80.0
		4	8	-	7 (G1S)	87.5	70.0
		5	-	4	3 (G1C)	27.3	75.0
13	28	1	24	20	17	70.9	85.0
		2	-	17	12 (G1C)	50.0	70.6
		3	-	3	3 (G1C)	12.5	100.0
		4	5	-	3 (G1S)	60.0	15.0
14	30	1	15	9	7	51.4	77.8
		2	7	4	4	57.2	100.0
		3	5	12	5	100.0	41.7
		4	3	7	3	100.0	42.9
		5	4	-	3 (G3S)	75.0	25.0
		6	3	-	3 (G3S)	100.0	25.0
		7	3	-	3 (G1S)	100.0	33.3
15	16	1	15	7	6	40.0	85.7
		2	-	5	5 (G1C)	33.3	100.0
		3	-	6	6 (G1C)	40.0	100.0
16	30	1	16	10	9	56.3	90.0
		2	18	12	11	61.1	91.7
		3	-	5	4 (G2C)	22.2	80.0
		4	-	6	4 (G1C)	25.0	66.7
		5	-	4	4 (G2C)	22.2	100.0
17	15	1	8	4	4	50.0	100.0
		2	7	5	4	57.2	80.0
		3	-	5	2 (G1C)	25.0	40.0
18	14	1	13	9	9	69.2	100.0
		2	9	-	5 (G1S)	55.6	55.6

^aPercent of members in communication subgroup which are common to both communication and socialization subgroups

^bPercent of members in socialization subgroup which are common to both communication and socialization subgroups

* (G2C) Number of members which are common to the second subgroup in communication, etc.

It sometimes occurred that two or more subgroups in one dimension had members in common with a subgroup in the other dimension. This is found to be the case in Schools 1, 4, and 5 among others. Subgroup 4 in School 1 existed only in the socialization dimension, but two of its three members were common to the second subgroup in the communication dimension. This is indicated in the table by (G2C) where G stands for subgroup, 2 for the number of the subgroup, and C for communication. The subgroups in Table XXVI were listed in such a way so as to maximize the overlap of pairs of subgroups in the two dimensions.

To test Hypothesis 6 required a more meaningful arrangement of the results of Table XXVI. Table XXVII gives the frequency distribution of the degree of commonality of membership in the subgroups of the two dimensions. This table reveals that seven communication subgroups had all of their members, or one hundred per cent, in common with the corresponding socialization subgroup, and fourteen socialization subgroups had all their members in common with the corresponding communication subgroup. An example is the third subgroup of School 8 in Table XXVI, where the five members in the communication subgroup were all members in a larger socialization subgroup of ten members. An examination of the fourth and fifth columns of Table XXVI will show a total of fifty-one and fifty-seven subgroups which were

TABLE XXVII

DISTRIBUTION OF SUBGROUPS IN WHICH THE PERCENTAGE OF MEMBERS OF ONE SUBGROUP
IS COMMON TO ITS CORRESPONDING SUBGROUP IN THE OTHER DIMENSION

Percentage level	Communication dimension f	Socialization dimension f
100	7	14
90 - 99	1	4
80 - 89	8	9
70 - 79	6	11
60 - 69	9	6
50 - 59	9	7
40 - 49	8	4
0 - 39	16	9
Totals	64	64

identified for all schools in the sample in communication and socialization, respectively. The column totals in Table XXVII show a total of sixty-four subgroups in each dimension, but the smaller totals indicate the correct number of subgroups. The apparent discrepancy in the two tables is due to the fact that a particular subgroup might have had members in common with more than one subgroup, to each of which it was then compared, and this accounts for the larger totals in Table XXVII. Further interpretation of Table XXVII reveals that 62.5 per cent of the communication subgroups and 79.7 per cent of the socialization subgroups had one half or more of their members common to the corresponding subgroup in the other dimension. With such large overlap of subgroup membership in the two dimensions, the hypothesis that subgroups in the two dimensions would be comprised of different members was rejected. This may be another indication that the communication and socialization dimensions are not that much separate from each other.

In summary, the test of Hypothesis 6 revealed that many of the communication and socialization subgroups in the schools of the sample had members in common, thus the hypothesis that the subgroups in the two dimensions would have different members was rejected.

Test of Hypothesis Seven

Hypothesis 7 stated that the members of a subgroup would have a number of similar characteristics. These characteristics were age, total and present school experience, years of training, grade level taught, and sex. The first five of the above six variables were continuous but the last was a dichotomous nominal variable. The first five variables were tested using one-way analysis of variance (2, pp. 281-297) and the sex variable was tested by inspection of the mean of the group, where males were arbitrarily classified as one and females as two. The analysis of variance is used to test differences between means of groups, not similarity within groups as is desired in this study. It was argued however that a significant F-ratio, which shows differences between groups, would thereby indicate similarity within groups, that is, the differences within groups would be less extreme than differences between groups. Some of the results in a few schools will be illustrated.

Table XXVIII shows the number of members and mean age of each socialization subgroup of School 1, the sociogram for which was shown in Figure 14 on page 126.

The differences between means of ages of the four subgroups were then tested by analysis of variance, one-way classification. The results of this test are given in Table XXIX.

The difference between means in age as shown in Table XXIX yielded a significant F-ratio of 3.09, so that the groups differed from each other as to age.

TABLE XXVIII
FREQUENCY OF MEMBERS AND MEAN AGE OF
SCHOOL 1 SOCIALIZATION SUBGROUPS

Subgroup No.	No. of members.	Mean age
1	12	33.25
2	6	52.33
3	3	49.33
4	4	41.75

An inspection of Table XXVIII reveals that the largest subgroup was also the youngest, having a mean age of 33.25. A middle-aged subgroup of four members had a mean age of 41.75; the other two subgroups had fairly close mean ages.

TABLE XXIX
SUMMARY OF ANALYSIS OF VARIANCE FOR AGE VARIABLE
OF SCHOOL 1 SOCIALIZATION SUBGROUPS

Source of variation	Sum of squares	Degrees of freedom	Mean square
Between groups	1701.64	3	567.21
Within groups	3849.00	21	183.29
Total	5550.64	24	F = 3.09

To obtain a better indication of subgroup similarities and differences, the summary of the analysis of variance result for the other four variables in School 1 is shown in Table XXX. This table shows that all of the differences in

TABLE XXX

SUMMARY OF ANALYSIS OF VARIANCE FOR
SCHOOL 1 SOCIALIZATION SUBGROUPS

Source of variation	Degrees of freedom	Total experience		Present school experience		Years of training		Grade level taught	
		SS*	MS**	SS	MS	SS	MS	SS	MS
Between groups	3	717.00	239.00	284.08	94.69	4.49	1.50	218.27	72.76
Within groups	21	1349.00	64.24	405.92	19.33	17.67	0.84	65.17	3.10
Total	24	2066.00	F=3.72	690.00	F=4.90	22.16	F=1.78	283.44	F=23.45
Probability level		0.03		0.01		0.19		0.000001	

*Sum of squares

**Mean square

means were significant but for years of training. However, as well, the members in two of the subgroups all had one year of training, as their variance was zero. Significance levels of the variables total experience, experience in the present school and grade level taught were 0.03, 0.01, and 0.000001, respectively. In order to get a clearer picture of the characteristics of each socialization subgroup in School 1, the means for each subgroup for each of the variables of the seventh hypothesis are shown in Table XXXI. A comparison of the subgroup means against each other for each variable gives further insight as to the character of each subgroup. Each of these subgroups will be described briefly.

Subgroup 1 is the youngest, has the least teaching experience, has been in the present school for the shortest period, has the most training, and teaches the second highest mean grade level in the school. It is composed of an equal number of men and women. Ten of the twelve members are teaching grades six through nine.

Subgroup 2 consists of the oldest staff members. It is composed entirely of six women all of whom are married. One of these is forty years old, another is twenty-five, and the other four are fifty-four or more years old. They had the lowest mean grade level taught, and teaching in grades one to four. Five of these women had been in this school between nine and sixteen years, and these same five had

TABLE XXXI

MEANS OF SOCIALIZATION SUBGROUPS IN SCHOOL 1

Subgroup No.	No. of members	Variable					Sex*
		Age	Total experience	Present school experience	Years of training	Grade level taught	
1	12	33.25	5.83	3.08	1.92	7.58	1.50
2	6	52.33	18.67	11.00	1.00	2.50	2.00
3	3	49.33	9.00	9.00	1.00	3.00	2.00
4	4	41.75	14.00	7.50	1.75	10.75	1.25
Grand Mean		41.12	10.60	6.40	1.56	6.32	1.64

*Males were designated as 1.00 and females as 2.00 for the sex variable. Also this variable was not tested by analysis of variance.

fifteen to thirty-one years total teaching experience. Their group mean was highest in the school on both of these variables. They had the lowest mean in years of training, all of them having had one year. Figure 14 on page 126 showed this subgroup to be isolated from the rest of the staff.

Subgroup 3 was composed of three married women, each of whom also had but one year of training. They were second lowest among subgroups in mean grade level taught and total experience, and second highest in age and experience in the present school. These women were between forty-five and fifty-two years old and teaching grades four, five, and the opportunity room. Each of them had all their teaching experience in this school, which ranged from five to thirteen years. The fourth subgroup ranked somewhere in between the first three described on each of the first four variables, but taught the highest mean grade level. It was composed of three males and one female member, all of them teaching high school.

The subgroups in School 1 in socialization were the only ones to exhibit differences at the 0.05 level in either dimension in four or more variables. In the whole sample few significant differences were found in the tests of the five variables using analysis of variance. Table XXXII summarizes the significant results found, when the level of significance has been adjusted to 0.10. Thus it will be

seen that only three schools in communication and four in socialization showed significant results in three or more of five variables.

TABLE XXXII

FREQUENCY OF SCHOOLS IN WHICH A GIVEN NUMBER OF VARIABLES IS SIGNIFICANT AT THE 0.10 LEVEL IN ANALYSIS OF VARIANCE TESTS

No. of variables out of five	Frequency of schools on dimension of	
	communication	socialization
Three or more	3	4
Two	0	4
One	8	5
None	7	5
Total	18	18

To show in which of the variables these differences were most likely to occur, Table XXXIII was prepared. The variable in which significant results occurred most often was grade level taught. This result was significant at the 0.05 level in seven schools of each dimension, but six of these were the same schools. This finding led to further investigation. It was found that all of the four schools in the sample offering grades one through twelve and two of the three offering grades one to nine were included in these six schools. Even more important, each of these schools had at least twenty-five staff members and the mean number of staff

members for these six schools was 29.3, or near the size of the largest schools in the sample. Herein lies an indication of why so few significant results were found; they were more likely to be found in the larger schools of the sample. When these same six schools were checked further as to significant differences, it was found that they accounted for nearly all the schools which had two or more significant results listed in Table XXXII. Thus the size of the school in this study seemed to have an important bearing on the test of this hypothesis. Table XXXIII also indicates that significant results occurred more often between socialization subgroups than between communication subgroups on each of the other four variables.

Table XXXIV shows the subgroups in communication and socialization classified by sex. This table lists those subgroups composed of all males, all females, mostly males, and mostly females. Males were assigned a value of 1.00 and females a value of 2.00 for purposes of classification by sex. A criterion of a mean of 1.01 to 1.25 was arbitrarily selected as a subgroup composed mostly of males, and one of 1.75 to 1.99 was selected for subgroups composed mostly of females. This meant that at least three-fourths of the subgroup was of the same sex. Table XXXIV shows that in communication three subgroups had male members only, three more had mostly male members, thirteen were composed

TABLE XXXIII

FREQUENCY OF SCHOOLS IN WHICH A GIVEN VARIABLE

IS SIGNIFICANT IN ANALYSIS OF VARIANCE TESTS

Variable	Freq. in communication at level			Freq. in socialization at level		
	0.05	0.05-0.10	0.05	0.05-0.10	0.05-0.10	0.05-0.10
Age	3	0	3			2
Total experience	1	1	1			2
Present school experience	1	2	2			4
Years of training	3	0	5			2
Grade level taught	7	0	7			0

TABLE XXXIV

SUBGROUPS CLASSIFIED BY SEX OF THEIR MEMBERS

School No.	a*	Meanst				b**	Means			
		1.00	1.01-1.25	1.75-1.99	2.00		1.00	1.01-1.25	1.75-1.99	2.00
1	3	-	-	-	2	4	-	1	-	2
2	3	-	-	-	1	4	-	-	-	4
3	2	-	1	-	-	2	1	-	1	-
4	1	-	-	-	-	2	-	1	-	-
5	2	-	-	-	-	3	1	-	-	2
6	6	1	1	-	3	3	-	1	-	1
7	2	-	-	2	-	2	-	-	1	-
8	3	-	-	-	1	4	-	1	-	2
9	3	-	-	1	-	2	-	-	2	-
10	2	-	-	2	-	4	-	-	1	3
11	5	1	-	-	3	5	1	-	2	1
12	3	-	-	-	-	3	2	-	-	-
13	2	1	-	-	-	3	1	-	-	-
14	7	-	-	1	3	4	-	1	1	1
15	1	-	-	1	-	3	-	-	2	3
16	2	-	-	1	-	5	-	1	1	1
17	2	-	-	-	-	3	2	-	-	-
18	2	-	1	-	-	1	1	-	-	-
Totals	51	3	3	8	13	57	9	6	12	20

*Number of communication subgroups in school.

+Means, where male = 1.00 and female = 2.00.

**Number of socialization subgroups in school.

entirely of females, and eight had mostly female members. Thus twenty-seven of fifty-one communication subgroups, or 53.0 per cent were composed either mostly or entirely of one sex. In socialization, nine subgroups were composed entirely of males, twenty entirely of females, six of mostly males, and twelve of mostly females. This makes a total of forty-seven of fifty-seven socialization subgroups, or 82.5 per cent which were composed mostly or entirely of one sex. It will be noted that there is a much greater tendency to separation of the sexes in socialization than in communication. Also there were 3.50 times as many communication subgroups of women or mostly women than as of their male counterparts, and the corresponding ratio for socialization was 2.14. There seems to be a greater tendency for women to form subgroups of their own sex than is the case for men. The fact that women outnumbered men in the total sample by about 1.6 to 1 had some bearing on the above ratios. Another interesting result is that four schools in socialization, Schools 2, 5, 17, and 18 had all of their subgroups composed entirely of either all males or all females. This was not true in communication for any school.

Description of Selected Subgroups

The four socialization subgroups in School 1 were already described. Subgroups in several more schools will

be described to illustrate lines of cleavage between one group and another which were quite common. These will be the socialization subgroups in School 3 and the communication subgroups in School 6.

The two socialization subgroups of School 3 were shown in Figure 9 on page seventy-one. The means of the two groups are shown in Table XXXV. Though there seemed to be considerable differences between the two groups in the first three variables, only the difference in the age was significant.

TABLE XXXV
SCHOOL 3 SOCIALIZATION SUBGROUP MEANS

Subgroup number	No. of members	Age	Total exp.	Present school exp.	Years of training	Grade level taught	Sex*
1	5	28.40	5.60	1.20	3.80	11.00	1.00
2	8	51.00	15.50	9.00	3.13	9.25	1.88
Grand Mean		42.31	11.69	6.00	3.38	9.92	1.54

*Mean for males = 1.00, for females = 2.00

It will be seen that the first subgroup is composed entirely of males who are considerably younger, have both less total and present school experience, teach at a higher grade level and have more years of training than the eight members of the second subgroup. Seven of the eight members of the latter group were women. Lines of cleavage in the two communication subgroups of the same school were similar, but

not as marked on any of the six variables.

The means for the six communication subgroups of School 6 are shown in Table XXXVI. School 6 was the largest school in the sample with thirty-three staff members, and offered grades one to twelve. It will be noted that a number of significant differences between means were found. The first subgroup means indicate that it had eleven males and one female member, was the youngest, had the least total experience and was second lowest in experience in the school and was near the upper end of years of training and grade level taught. Subgroup four was composed of seven young men who were second lowest in total experience, second highest in years of training, highest in grade level taught, but had been in their present school longer than all subgroups but the sixth.

Subgroup 6 was made up of three women who had by far the highest mean age, had the most total and present school experience, taught the lowest grade level, and were tied with two other subgroups composed entirely of women in least amount of training. Subgroup 3 was also made up of three women who were second oldest, second highest in total experience, taught the second lowest grade level, tied for at least years of training, and were at about the mean for present school experience. Subgroups 2 and 5 ranked generally somewhere in between the others on the variables,

TABLE XXXVI

SCHOOL 6 COMMUNICATION SUBGROUP MEANS

Subgroup No.	No. of members	Age*	Total experience**	Present school experience	Years of training*	Grade level taught†	Sex†
1	12	26.92	6.92	4.75	3.25	9.58	1.08
2	5	35.60	14.20	3.60	4.40	10.00	1.40
3	3	41.67	14.67	5.33	2.00	3.67	2.00
4	7	27.86	10.14	7.14	3.29	10.57	1.00
5	3	36.00	12.00	6.33	2.00	6.33	2.00
6	3	53.33	25.00	10.67	2.00	1.33	2.00
Grand Mean		33.00	11.52	5.82	3.09	8.27	1.36

*These results were significant at the 0.05 level.

**This result was significant at the 0.06 level.

†Mean for males = 1.00, for females = 2.00.

though it might be noted that the second subgroup had the least present school experience, the most training, and taught at the second highest grade level, and that the fifth subgroup was composed entirely of women, who tied for least years of training.

Conclusions Arising Out of Tests of Hypothesis Seven

Since 53.0 per cent of all the communication subgroups and 82.5 per cent of all socialization subgroups were composed mostly or entirely of members of the same sex, Hypothesis 7.6 which stated that subgroup members would be composed of mostly one sex was accepted.

Few significant results were found on the variables in the tests of Hypothesis 7.1 through 7.5. The only one of these variables in which considerable significance was found was in grade level taught where seven schools on each of the dimensions of communication and socialization showed significant results. Despite few significant results, a number of repetitive patterns in subgroup types emerged. It was found that in schools having two or more subgroups on a dimension, two of the subgroups were very liable to differ from each other quite markedly on all six variables. This pattern occurred quite frequently in the schools of the sample on both dimensions. The characteristics of each of these two types of subgroups will be described below, as

well as those of a less frequently occurring third type. These subgroup types are different from the types of subgroup structure described earlier in this chapter where the relationship of all the subgroups to the whole school was considered, in that the present types will consider characteristics within each subgroup itself.

The first type of subgroup was composed entirely or almost entirely of female members, whose group means in their school ranked highest on age, total experience, experience in the present school, lowest on grade level taught, and lowest on years of training, which was usually one year. Seven of the communication subgroups and twelve of the socialization subgroups in the sample could be included in this type. The socialization subgroups 2 and 3 in School 1 and subgroup 2 in School 3, and communication subgroups 3 and 6 in School 6, all of which were described in this chapter, are examples of this type.

Subgroups of the second type were composed of men only whose means in their school were lowest on age, total experience and present school experience, and highest on years of training and grade level taught. Seven subgroups on each of the two dimensions could be typified this way. Examples of this type described earlier are the first socialization subgroup in School 3 and communication subgroups 1 and 4 in School 6. The first socialization subgroup

of School 1 qualifies in every respect but sex, as it was composed of an equal number of men and women.

A few subgroups of a third type were found, quite similar to the second type but differing on a number of variables. This type was composed of mostly males who were older, had more training and taught at the upper grade levels, and usually but not always had a higher mean on total years experience and present school experience. Thus they differed from the second type only in that they were older and usually had more experience.

The following generalizations regarding subgroup types can then be made in the study of the schools of this sample. Women teachers who are the oldest on staff, have been teaching for the longest period of time, have been on their present staff for the longest period, are teaching at the lowest grade levels offered in their school, and have the least training on staff and very often amounting to only one year, tend to choose each other in school staffs whether it is for purposes of communication in school matters or for purposes of socializing informally. They do this to the exclusion of staff members with different characteristics on these variables. This constitutes the first type of subgroup mentioned above. Males who were also the youngest members on staff and ranked lowest on mean years of total experience as well as in the present school, and highest in years of teacher training as well as grade level taught, tended to choose each

other and formed exclusive subgroups. On a lesser scale males who were older, most highly trained and teaching at the upper grade levels of their school but usually with more total and present school experience than the second type tended to choose each other. Fifteen of fifty-one communication subgroups or 28.9 per cent in the sample could be classified in these three types, and twenty-three of fifty-seven socialization subgroups or 40.4 per cent of the sample could be classified this way.

The three types described were the most deviant types of subgroups, or those whose members differed from one another most widely on the six variables. Particularly in schools in which there were three or more subgroups on a dimension, a less extreme type sometimes occurred. Its members tended somewhere in between the three types described on all variables, that is, their means were closer to the grand mean than those of any of the other subgroups, where the grand mean is the sum of all the values of all subgroup members on a given variable divided by the total number of subgroup members.

This chapter has described the tests of the sixth and seventh hypotheses and arrived at generalizations regarding school subgroup structures and subgroup types. As examples of both structures and types a number of subgroups were described in detail. Chapter VII will state the conclusions of the study, give some implications for school administration, and suggest areas of further research.

BIBLIOGRAPHY FOR CHAPTER SIX

1. Blocker, C. E. and R. H. McCabe. Relationships Between The Informal Organization and the Curriculum in Six Junior Colleges. Austin, Texas, 1964.
2. Ferguson, George A. Statistical Analysis in Psychology and Education, Second Edition. New York: McGraw-Hill Book Co., 1966.

CHAPTER VII

CONCLUSIONS AND IMPLICATIONS

This study began with the formulation of a number of hypotheses regarding characteristics of school influentials and their reaction to their schools on several variables, as well as characteristics of school subgroups. This chapter will state the conclusions resulting from this study, indicate some implications for educational administration, and give suggestions for further study.

Summary of Findings and Conclusions

The influentials on the six dimensions of communication, socialization, reliance as to discipline, reliance as to teaching methods and materials, reliance as to interpretation of school policies and regulations, and attributed influence were determined for each school from a matrix which was constructed from the choices of all staff members in a school. The sample included eighteen schools and 389 staff members. The matrices for the first five dimensions were cubed using operations of matrix algebra; a reliance subweight substitution method was applied to the reliance dimension after the cubing operation. These cubed matrices showed the three-step channels for a given dimension, and were used to determine who was influential in each staff on each dimension. It was assumed that the cubed matrices were

the best representation of communication, socialization, and reliance channels in the system. Influentials were than compared to non-influentials on each task area dimension.

Influentials were significantly different from non-influentials on most of the variables tested. Generally speaking they had more total teaching experience, had been in the present school longer, had more training, taught at a higher grade level than non-influentials, and were of the male sex. This was true for all variables on the attributed influence dimension and all three reliance dimensions except for the age variable; the results for age were not significant on attributed influence and reliance as to discipline. The influentials on communication had significantly more experience in the present school and were more highly trained.

The fact that an individual was considered influential by his fellow staff members did not appear to affect his reaction to the school. Influentials did not regard their school as more effective in educating its students nor were they more satisfied with their teaching situation than were non-influentials. A possible reason for the results of at least the first of these variables not being significant is that most administrators were classed as influentials. This could have influenced their judgement as to their school's effectiveness and at the same time their satisfaction with their position.

All principals were influential on the three reliance dimensions and attributed influence, as were three-fourths of the vice-principals. Nearly all principals and vice-principals were influential on communication. Generally, teachers regarded the principal to be the most influential staff member and the vice-principal as the second most influential member. Principals were not much more influential than vice-principals on communication. All principals however were generalized influentials, or influential on at least four of five task area dimensions. It was also found that essentially the same people on school staffs were influential on all five task area dimensions.

Subgroups on the dimensions of communication and socialization were detected in each school through a factor analytic approach after some manipulation of the matrices before the cubing procedure. It was found that many of the same members were located in the socialization and communication subgroups in schools.

After subgroup membership was determined, similarities of characteristics of members within subgroups were investigated. The majority of the subgroups in the sample were composed entirely or mainly of members of the same sex. Differences on the other variables of the seventh hypothesis could not be tested statistically due to the small sample size. However, a study of the subgroup means of these

variables in schools revealed at least three subgroup types. These were of the oldest, female, highly experienced teachers with the least training and teaching the lowest grade levels; the youngest, male, least experienced teachers with the most training teaching at the upper grade levels of their school; and a less frequently occurring third type of older, male, more experienced teachers, also with the most training and teaching at the upper grade levels. The last two types were most different from the first type described. In between were other subgroups tending toward the mean of the whole school, who were not as extreme on any of the variables.

From the sociograms drawn from the original reciprocated matrix and the subgroup structure determined by factor analysis five different types of school group structures were developed. These were structures with only one subgroup per school, a "wheel" type structure, a structure having at least one of its subgroups separated from the main flow, a structure with subgroups connected to each other through only one or two people, and a structure with considerable overlap of membership. The last two types of structure were most common. Thus school subgroup structures are usually such that there are at least some interconnections between groups.

No significant relationships between size of school

and size of subgroups were found, but there was a significant positive relationship between staff size and number of subgroups formed. This is in keeping with Hare's statement that larger groups break into more subgroups (4).

The methodology developed by Blocker et al. (2) in the analysis of influence structures appeared to be a useful research technique in determining influentials and then their characteristics on five task area dimensions in schools. The factor analysis approach seemed to yield a good indication of subgroup structure when used as modified. Evidence as to its usefulness arises from the fact that the subgroups closely resembled the apparent subgroups in the sociograms drawn from the original reciprocated matrix, and proved to be an aid in drawing sociograms which otherwise seemed impossible to draw. The method led eventually to the development of five types of school group structure in this study. Three types of subgroups which differed from the average on six variables were described on the basis of the results obtained.

The study as a whole gave empirical evidence across a number of schools to a number of frequently encountered speculations about influence structures. These were specifically in the realm of characteristics of influential people in schools and similarity of characteristics within subgroups.

The socialization dimension was thought to be separate from the communication and other task area dimensions. There is some evidence in this study however, that the communication dimension is not that different from the socialization dimension. The results of the study which support this conclusion are:

(1) There was much overlap of membership in the communication and socialization dimensions.

(2) The communication dimension showed fewer significant results as to differences between influentials and non-influentials than the other four task area dimensions.

(3) Few of the administrators in the study were outside of the socialization network.

(4) Principals had a lower mean rank on communication than on any of the other four task area dimensions.

The above evidence appears at first to contradict Bezeau (1) who reported differences between the two structures. Bezeau, however, used the unreciprocated matrices for these two dimensions and by a process of subtraction determined an individual's incongruence in the two structures. In the present study only reciprocated choices were used; differences in results may be due to differences in treatment.

Implications for Educational Administration

One implication which arises is from the finding that

teachers regard the principal to be the most influential staff member on each of the five task area dimensions and the vice-principal to be the second most influential member. The fact that administrators are important people in schools ought to affect their behavior.

Administrators can expect the most influential staff members to be somewhat different from the rest of staff on a number of personal variables. Table XI on page ninety-one indicated that influentials were significantly different from non-influentials on four personal variables. Thus administrators could have a general idea of whom to expect to be influential on a staff, especially when they find themselves in a new situation.

The fact that two types of subgroups quite different from each other on six variables are likely to be present in larger schools has important implications for administrators in education. Since variables like age, length of teaching experience, amount of training, and grade level taught are involved, there are likely to be differences in viewpoint as to the aims of education, the different perceptions of staff members as to the importance of their contribution to the school, and so forth, which might possibly lead to intergroup conflict. Females had a much greater tendency to form subgroups in both communication and socialization dimensions than did males, even when the larger number of females in

the sample was taken into account (See Table XXXIV on page 145). This also has some implications for educational administrators, nearly all of which in this sample were males. The finding is in keeping with that of House, who found females to be more segregated than males in the social structure of the school which he studied (5, p. 241).

Suggestions for Further Study

A number of possibilities for further investigation arise from this study. The method used could be applied to organizations other than schools to define influentials, with the reliance dimensions being adapted to fit the particular type of organization. Tests could be carried out between influentials and non-influentials to see if they differed in a manner similar to the one in this study.

The lack of many significant results on a within schools basis seems inevitable because of the small sample size in the tests of the first, second, and seventh hypotheses, or wherever significance tests were used. Since the larger schools in the sample yielded more significant results, it is suggested that the study might be repeated in larger schools, say of twenty-five or more staff members. The present sample was entirely from rural Alberta, in which there are still a fairly large number of older married women teaching, who often have been in the same school a long time,

and also have had little teacher training; this was evident in many of the subgroups in the sample. Therefore, it is suggested that a study of this type might be carried on in city schools, to see if the results regarding influential characteristics and subgroup membership are similar to those in this study. Such a study across a number of schools would add to the findings of single school studies by House (5) and McCleary (6) which were carried on in urban areas.

A number of further points for follow-up suggest themselves as a result of the findings on subgroup structure. The relationship of influentials on communication to their respective subgroups might be examined. It would be interesting, for example, to determine how frequently they are members of more than one subgroup, and to find their position of relative importance in each subgroup. Similarly it would be useful to locate the positions of administrators in the communication and socialization dimensions in order to pursue questions such as the following. Are administrators in central focus on communication? Are they somewhat removed from the main flow in socialization? Administrative theory seems to indicate they should be important in the communication network, but somewhat isolated from the socialization network. It would be interesting to know where school administrators generally stand in the two dimensions. The "wheel" subgroup structures

found in a number of schools in communication with the principal at the hub deserve further study. How do these schools differ from other schools in the leadership given by the principal? Are the principals in these schools less authoritarian, and do fewer subgroups develop in such schools as Blum suggests (3, pp. 44-47)? Another problem to pursue would be how characteristics of the school physical plant affects subgroup structure; for example, does an isolated subgroup usually teach in a separate building from the rest of the staff?

Another problem worthy of investigation is why the communication and socialization subgroups in some schools were similarly constituted and why this was not the case in other schools. Is this the result of actual differences or is it due to different interpretation of the communication and socialization questions by school staffs?

.

In conclusion, it was found that influentials in school staffs were significantly different on a number of variables from other staff members. The school subgroups investigated appeared to develop around members with certain similar personal characteristics. Both these findings have implications for educational administrators and have given some empirical evidence as to school influence and subgroup structures.

BIBLIOGRAPHY FOR CHAPTER VII

1. Bezeau, Lawrence. "The Instrumental-Expressive Dichotomy in School Staffs." Unpublished M. Ed. Thesis, University of Alberta, 1966.
2. Blocker, C. E., R. H. McCabe, and A. J. Prendergast, A Method for the Sociometric Analysis of the Informal Organization Within Large Work Groups. Austin, Texas, 1964.
3. Blum, Richard. The Study of Groups. Washington, D.C.: George Washington University, 1953.
4. Hare, A. Paul. "A Study of Interaction and Consensus in Different Sized Groups," American Sociological Review, XVII (1952), pp. 261-267.
5. House, J. H. "An Analysis of Interpersonal Influence Relations." Unpublished Ph. D. thesis, University of Alberta, 1966.
6. McCleary, Lloyd E. "A Study of Interpersonal Influence Within a School Staff." Unpublished Ed. D. thesis, University of Illinois, 1957.

BIBLIOGRAPHY

A. BOOKS

- Argyris, Chris. Understanding Organizational Behavior. Homewood, Ill.: The Dorsey Press, Inc., 1960.
- Barnard, Chester I. The Functions of the Executive. Cambridge, Mass.: Harvard University Press, 1938.
- Blocker, C. E., R. H. McCabe, and A. J. Prendergast. A Method for the Sociometric Analysis of the Informal Organization Within Large Work Groups. Austin, Texas, 1964.
- Blocker, C. E., and R. H. McCabe. Relationships Between the Informal Organization and the Curriculum in Six Junior Colleges. Austin, Texas, 1964.
- Blum, Richard. The Study of Groups. Washington, D.C.: George Washington University, 1953.
- Campbell, R. F., J. E. Corbally, and J. A. Ramseyer. Introduction to Educational Administration, Third Edition. Boston: Allyn and Bacon, Inc., 1966.
- Cartwright, Dorwin and Alvin Zander (eds.). Group Dynamics: Research and Theory, Second Edition. New York: Harper and Row, Publishers, 1960.
- Charters, W. W. "An Approach to the Formal Organization of the School," in D. E. Griffiths (ed.). Behavioral Science and Educational Administration. Chicago: The National Society for the Study of Education, 1964. pp. 243-261.
- Dubin, Robert. The World of Work. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1958.
- Ferguson, George A. Statistical Analysis in Psychology and Education, Second Edition. New York: McGraw-Hill Book Co., 1966.
- Festinger, Leon, S. Schachter, and Kurt Back. Social Pressures in Informal Groups. Stanford, Cal.: Stanford University Press, 1950.
- Fruchter, Benjamin. Introduction to Factor Analysis. Princeton, N. J.: D. Van Nostrand Co. Inc., 1954.

- Griffiths, D. E., D. Clark, R. Wynn, and L. Iannaccone. Organizing Schools for Effective Education. Danville, Ill.: Interstate Publishers and Printers, Inc., 1961.
- Hare, A. Paul. A Handbook of Small Group Research. Glencoe, Ill.: The Free Press, 1963.
- Iannaccone, Lawrence. "An Approach to the Informal Organization of the School," in D. E. Griffiths (ed.) Behavioral Science and Educational Administration. Chicago: The National Society for the Study of Education, 1964. pp. 223-242.
- Iannaccone, Lawrence. "The Social System of an Elementary School Staff." Unpublished Ed. D. thesis, Teachers' College, Columbia University, 1958, reported in D. E. Griffiths, D. Clark, R. Wynn, and L. Iannaccone. Organizing Schools for Effective Education. Danville Ill.: Interstate Publishers and Printers, Inc., 1961.
- Lindzey, G. and E. T. Borgatta. "Sociometric Measurement," G. Lindzey (ed.). Handbook of Social Psychology. Reading, Mass.: Addison-Wesley Publishing Co. Inc., 1954. pp. 420-424.
- Lundberg, G. A., C. C. Shrag, and O. N. Larsen. Sociology, Third Edition. New York: Harper and Row, 1963.
- Mazlow, A. H. Motivation and Personality. New York: Harper and Brothers, 1954. pp. 80-106.
- Miklos, Erwin. "Some Aspects of the Social Structure of a School," in F. Enns (ed.). The Tasks of the Principal. Edmonton: Policy Committee, Leadership Course for School Principals, 1963. pp. 21-29.
- Moreno, J. L. Who Shall Survive? New York: Beacon House, 1934.
- Roethlisberger, F. J. and W. J. Dickson. Management and the Worker. Cambridge, Mass.: Harvard University Press, 1956. Chapter 23.
- Selltiz, Claire, M. Jahoda, M. Deutsch, and S. W. Cook. Research Methods in Social Relations. New York: Holt, Rinehart, and Winston, 1965.
- Siegel, Sidney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Co., 1956.

Slater, Philip E. "Role Differentiation in Small Groups," in A. Paul Hare, E. F. Borgatta, and R. F. Bales (eds.). Small Groups: Studies in Social Interaction. New York: Alfred A. Knopf, 1961. pp. 498-515.

Stewart, R. The Reality of Management. London: Wm. Heineman, Ltd., 1963.

Weber, Max. "Essentials of Bureaucratic Organization: An Ideal Type Organization," in R. K. Merton et al. Reader in Bureaucracy. Glencoe, Ill.: The Free Press, 1952. pp. 18-27.

B. PERIODICALS

Argyris, Chris. "The Individual and Organization: Some Problems of Mutual Adjustment," Administrative Science Quarterly, II (1957), pp. 1-24.

Beum, C. O. and G. Brundage. "A Method for Analyzing the Sociomatrix," Sociometry, XIII (1950), pp. 141-145.

Beum, C. O. and J. H. Criswell. "Applications of Machine Tabulation Methods to Sociometric Data," Sociometry, X (1947), pp. 227-232.

Chabot, James. "A Simplified Example of the Use of Matrix Multiplication for the Analysis of Sociometric Data," Sociometry, XII (1950), pp. 131-140.

Coleman, J. S. and D. MacCrae. "Electronic Processing of Sociometric Data for Groups up to 1,000 in Size," American Sociological Review, XXV (1960), pp. 722-727.

Congreve, Willard J. "Administrative Behaviour and Staff Relations," Administrator's Notebook, VI (October, 1957).

Cooper, Dan H. "The Potentialities of Sociometry for School Administration," Sociometry, X (1947), pp. 111-121.

Festinger, Leon. "The Analysis of Sociograms Using Matrix Algebra," Human Relations, II (1949), pp. 153-157.

Forsyth, Elaine and Leo Katz. "A Matrix Approach to the Analysis of Sociometric Data," Sociometry, IX (1946), pp. 340-347.

- Harary, F. and I. C. Ross. "A Procedure for Clique Detection Using the Group Matrix," Sociometry, XX (1957), pp. 205-215.
- Hare, A. Paul. "A Study of Interaction and Consensus in Different Sized Groups," American Sociological Review, XVII (1952), pp. 261-267.
- Jensen, Gale E. "The School as a Social System," Educational Research Bulletin, XXXIII (February, 1954), pp. 38-46.
- Katz, Leo. "Punched Card Techniques for the Analysis of Multiple Level Sociometric Data," Sociometry, XIII (1950), pp. 108-122.
- MacCrae, Duncan. "Direct Factor Analysis of Sociometric Data," Sociometry, XXIII (1960), pp. 360-371.
- Weiss, Robert and Eugene Jacobson. "A Method for the Analysis of the Structure of Complex Organizations," American Sociological Review, XX (1955), pp. 661-668.

C. UNPUBLISHED MATERIAL

- Bezeau, Lawrence. "The Instrumental-Expressive Dichotomy in School Staffs." Unpublished M. Ed. thesis, University of Alberta, 1966.
- House, John H. "An Analysis of Interpersonal Influence Relations." Unpublished Ph. D. thesis, University of Alberta, 1966.
- McCleary, Lloyd. "A Study of Interpersonal Influence Within a School Staff." Unpublished Ph. D. thesis, University of Illinois, 1957.

APPENDIX A

SCHOOL ORGANIZATION QUESTIONNAIRE

SCHOOL ORGANIZATION QUESTIONNAIRE

The purpose of this questionnaire is to provide information on various organizational characteristics of schools, that is, information on channels of communication, patterns of reliance, and so on.

It is important that your answers be independent so please do not discuss them with other teachers.

You will be provided with a separate staff list for your school on which each staff member has been assigned a number. In completing this form please indicate yourself and other staff members by number and not by name. This ensures anonymity and facilitates computer analysis of the data. All information given in this questionnaire will be held in the strictest confidence.

* SCHOOL SECRETARIES and FULL-TIME LIBRARIANS should omit all questions marked with an asterisk.

School Code Number_____

Your number_____

SECTION A

For the questions in Section A circle the number of each person with whom you interact in the way specified. There are no lower or upper limits to the number of choices for each question. Choose as few or as many people as you feel are necessary to reply fully. Please circle "none" if this is your answer. This survey is limited to the school staff so all responses on Questions 1 to 6 must be staff members.

1. During the course of a typical school week, in school or out of school, with which individuals are you most likely to discuss general school matters (teaching duties, school events, school policies, school program, students, etc.)?

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	NONE	

2. With which individuals are you most likely to socialize with informally during recesses, during noon-hours, and/or before and after school hours?

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	NONE	

- *3. If you had a problem concerning discipline in your classroom from whom would you likely seek advice?

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	NONE	

*4. If you had a problem concerning the organization of teaching materials, teaching methods, tests, or assignments, from whom would you likely seek advice?

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	NONE	

5. If you had a problem concerning the interpretation of school policies and regulations, from whom would you likely seek advice?

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	NONE	

6. In your opinion, which individuals in this school are most influential in initiating changes in general school practices such as testing programs, school regulations, school activities, etc.?

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49	50	NONE	

SECTION B

Answer each of the following questions by checking one of the possible alternatives. PRINCIPALS, omit Question 11.

7. Compared with other schools known to you, how effective do you judge your school to be in educating the students who come to it?
- (1) outstanding_____
 - (2) very good_____
 - (3) slightly above average_____
 - (4) slightly below average_____
 - (5) poor_____
 - (6) very poor_____
8. How well satisfied are you with all aspects of your teaching or working situation in this school?
- (1) enthusiastic_____
 - (2) satisfied_____
 - (3) fairly well satisfied_____
 - (4) somewhat dissatisfied_____
 - (5) dissatisfied_____
 - (6) very dissatisfied_____
- *9. If you could choose your profession again, would you choose teaching, knowing what you do now about teaching?
- (1) definitely yes_____
 - (2) probably yes_____
 - (3) don't know_____
 - (4) probably no_____
 - (5) definitely no_____
10. How much salary do you feel you should be receiving for your present job?
- (1) less than my present salary_____
 - (2) about as much as my present salary_____
 - (3) between \$100 and \$1000 per year more than my present salary_____
 - (4) between \$1000 and \$2000 per year more than my present salary_____
 - (5) more than \$2000 per year more than my present salary_____

11. How effective do you consider your principal to be in performing all the various functions which he should perform? (This item is for research purposes only and even averages of scores are strictly confidential)

- (1) outstanding_____
- (2) very good_____
- (3) slightly above average_____
- (4) slightly below average_____
- (5) poor_____
- (6) very poor_____

SECTION C

Answer the following questions as indicated.

12. School Code_____ 13. Your number_____ 14. Age in years_____
15. Sex: (1)Male_____ (2)Female_____ (Please check correct one)
16. Marital Status: (1)Single_____ (2)Married_____
- (3)Widowed_____ (4)Divorced_____
17. For this question, count this school year as a full year.
- *Total years of teaching experience_____
- Years of experience in this school_____
- *18. Years of teacher education for salary purposes: (Circle the correct number. Drop fractional years)
- 1 2 3 4 5 6 7
- *19. Circle the one grade in which you spend most of your teaching time this year.
- 1 2 3 4 5 6 7 8 9 10 11 12
- *20. Circle all the other grades that you teach this year.
- 1 2 3 4 5 6 7 8 9 10 11 12
- *21. If you are teaching in a departmentalized junior or senior high school please list the subjects that you teach.
(Be specific: eg. Math 10 & 20 and Grade 7 science)
-

22. Please check any of the following positions that you hold.

- (1) principal_____ (2) vice-principal_____
(3) department head_____ (4) school secretary_____
(5) librarian_____ (6) guidance counsellor_____
(7) relieving teacher (not substitute teacher)_____
(8) other administrative position (please specify)_____

23. If you are a school secretary or relieving teacher how many hours per week do you work at this school?
If you are a vice-principal or principal how many hours per week are you allotted for administration?
If you act as librarian or guidance counsellor how many hours per week are you allotted to perform this function?

24. If you are a department head what is your department?
If you are a principal or vice-principal in what division do you specialize, if any? That is, are you a primary specialist, a Division II specialist, etc.?

APPENDIX B

TABLES OF SELECTED DESCRIPTIVE DATA

TABLES OF SELECTED DESCRIPTIVE DATA

TABLE XXXVII

DISTRIBUTION BY AGE OF SCHOOL STAFF MEMBERS IN THE SAMPLE

Age range	Number of teachers
20 - 29	121
30 - 39	75
40 - 49	77
50 - 59	82
60 - 69	22
70 - 79	1
No reply	11

TABLE XXXVIII
DISTRIBUTION BY TOTAL YEARS OF TEACHING EXPERIENCE
OF TEACHERS IN THE SAMPLE

Number of years	Number of persons
1 - 9	164
10 - 19	118
20 - 29	50
30 - 39	27
40 - 49	3
No reply	27

TABLE XXIX

DISTRIBUTION BY YEARS OF TEACHING EXPERIENCE IN
THEIR PRESENT SCHOOL OF TEACHERS IN THE SAMPLE

Number of years	Number of staff members
1	103
2	59
3	53
4	25
5 - 9	76
10 - 19	47
20 - 29	5
30 - 39	1
No reply	20

TABLE XL

DISTRIBUTION BY YEARS OF TEACHER EDUCATION FOR
SALARY PURPOSES OF TEACHERS IN THE SAMPLE

Number of years	Number of teachers
1	117
2	74
3	41
4	89
5	26
6	12
7	2
No reply	28

TABLE XLI

GRADE LEVELS AT WHICH TEACHERS IN THE SAMPLE
SPEND MOST OF THEIR TEACHING TIME

Grade level	Number of teachers
1	32
2	26
3	24
4	25
5	25
6	28
7	36
8	36
9	47
10	38
11	25
12	18
No reply	29

TABLE XLII

PERCENTAGE OF TOTAL VARIANCE ACCOUNTED FOR BY
THE FACTORS FOR EACH SCHOOL ANALYSIS

School No.	Size of Staff	Communication		Socialization	
		No. of factors	Percent of total variance accounted for	No. of factors	Percent of total variance accounted for
1	29	5	73.3	5	84.3
2	19	4	80.1	5	81.0
3	16	3	65.6	2	79.4
4	20	4	74.3	3	66.2
5	14	2	91.4	2	84.0
6	33	10	91.7	7	82.1
7	20	2	80.0	3	76.4
8	29	3	91.0	4	94.6
9	15	3	80.6	3	89.9
10	17	2	97.3	4	92.5
11	25	6	78.2	5	86.7
12	19	3	82.1	4	85.8
13	28	5	94.0	4	94.8
14	30	7	92.1	6	93.7
15	16	1	87.8	3	94.5
16	30	4	93.2	5	88.9
17	15	4	84.8	3	76.5
18	14	2	92.3	4	99.2

B29869